PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

Vol. 109, No. 12 Thursday, September 21, 1939 Price Ten Cents

Canada Adopts Strict Control of Exports

Pulp, Paper and Other Forest Products Exports Now Under Strict Regulation As Government Creates Foreign Exchange Board — Provision of Interest To American Holders of Canadian Securities—Other Late News.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., September 18, 1939—Exports of pulp and paper and other forest products in Canada are today under the strict regulation and control of the Canadian Government, as indeed is every other commodity in Canada's import and export trade. This follows the creation of a Foreign Exchange Control Board whose functions were operative as from September 16. This Board has been given wide power in foreign exchange dealings and over all payments from Canadians to people outside the Dominion, as well as power to license imports and exports, including money and securities. The purpose of this new departure is to make sure that the country's foreign exchange resources are used in the national interest, while the main object of export control is to conserve supplies for the use of this country and its allies and to prevent exports from this country from reaching the enemy directly or indirectly. As regards imports, their control will be directed to ensure that foreign exchange requirements of importers are based on normal commercial transactions. The Board will also use the exchange stabilization fund to assist import and export trade by maintaining more stable exchange rates than would otherwise be possible.

No Interference with Legitimate Trade

The policy will not involve interference with legitimate commercial transactions, nor with acquisition of funds required for servicing Canada's foreign debt. As regards exports of pulp and paper, these, it is expected, will proceed normally, except that they will be under license so as to ensure that their ultimate destination is to a friendly or neutral country. In respect to imports, no prohibitions are set up, though all will be under regulation. Special provision is made not to impede small transactions in general commodities by the public and in particular every effort will be made to avoid interfering with the tourist trade.

Provision Interesting to Security Holders

A provision of special interest to outside holders of securities in Canadian enterprises is one to the effect that exchange for payment of interest, or loan redemption, or dividends, must be applied for 30 days before the money is required, and the Board must deal with such transactions, with the power to reject in whole or in part any applications submitted. Other provisions are:

Residents of Canada possessing or controlling any forms of foreign exchange totaling in value more than $1,000, must make a declaration to the board on forms provided by chartered banks. The same must be done respecting foreign exchange subsequently acquired.

Residents of Canada owning or controlling securities not exclusively payable in Canadian dollars, and shares in companies with head offices outside Canada, valued at more than $1,000, must make a similar declaration.

No Canadian resident may transfer Canadian dollars to a non-resident in excess of $100 a month, without permit from an authorized dealer.

Non-residents leaving Canada may take with them Canadian currency or foreign exchange up to the amount they brought in. Special forms will be used in making declarations when crossing the border, when the amounts or goods value carried are in excess of the $100 limits.

Heavy penalties in fines and imprisonment are provided for those breaking the law as established by the order in council.

An authorized dealer can dispose of an application for foreign exchange only if he is convinced the application is for normal requirements. Otherwise he refers the applicant to the board.

Normal requirements include exchange for payment of goods coming within the usual scope of the applicant's business, payment for normal services such as insurance premiums and claims, commissions, salaries, freights, dues, patent rights, royalties and payments of like character, and for reasonable traveling expenses.

Foreign securities may be bought or sold within Canada but shall not be exported or imported except as permitted by the board through licences.

If the board deems it advisable, it may require that any foreign securities in the control or owner-

(Continued on page 25)

Wisconsin Disturbed By Rising Pulp Prices

Uncertainty Exists Among Several Mills As Prices On Swedish Spruce Pulp Advance and Freight Costs Rise $6 Per Ton — Governor Expected To Sign Wolf Reservoir Bill To Remedy Water Supply — Other News.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., September 18, 1939—A state of uncertainty exists among a number of Wisconsin paper mills because of the soaring prices of spruce pulp imported from Sweden. The declaration by Canada has complicated the situation, according to a statement issued by John Stevens, Jr., vice-president and production manager of the Marathon Paper Mills Company, Rothschild, Wis. The declaration makes pulp conditional contraband and prevents it from being shipped to Montreal and thence to Wisconsin ports on the Great Lakes.

Another complicating factor, he says, is the withdrawal of prices quoted on wood pulp in Sweden and Finland, leaving mills unable to tell exactly what the new prices will be.

Some of the mills have taken the same move and have cancelled their present price schedules. They plan to wait until conditions become stabilized before announcing new price lists.

Freight costs to Wisconsin on pulp coming from Scandinavian countries also have built up the price structure. Shipments must now be accepted at Baltimore, Md., and reshipped by rail to the Middle West. This means at least $6.00 per ton more for shipping costs than by boat through the St. Lawrence River into the Great Lakes.

Mr. Stevens believes the demand for domestic pulp will cause those prices to be advanced also. Mills are hoping the foreign shippers will not find the situation as difficult as it now seems because of the extra costs of war hazards, and that a reasonable price structure may prevail.

Governor Expected to Sign Reservoir Bill

Paper mills of the Fox River Valley have finally won out in their fight to obtain additional water in the summer drought period from the Wolf River tributary. The bill pending in the Wisconsin Legislature granting a charter to the Wolf River Reservoir Company to build a vast storage reservoir at Lily, Wis., passed the Assembly last week, was approved as to amendments by the Senate, and is in the hands of Gov. Julius P. Heil for signature. It is believed the governor will approve the bill.

The bill as finally passed stipulates only one site at which the reservoir can be built, and prescribes the minimum water level at the dam at 15 feet. The water is to be released as the flow in the Wolf River subsides, so as to maintain a steady current for paper mills using water power along the Fox River. The Wisconsin Public Service Commission is empowered to fix charges to be assessed against the paper mills and power companies benefiting from the project.

It was understood that construction of the reservoir and dam will be started as soon as final approval is given, so the spring flood waters can be impounded for use in the summer of 1940.

Additional regulation of water flow is also sought by mills along the Wisconsin River, according to a bill introduced by Senator Otto Mueller of Wausau, Wis. It would pave the way for construction of a series of reservoirs on the upper Wisconsin River by the Wisconsin Valley Improvement Company. The company already operates a series of dams and reservoirs, but desires to augment the storage because of the vast amount of water power used by the large mills operating along the Wisconsin. The bill has passed the Senate and is now before the Assembly. It vests wide authority in the public service commission to pass upon applications of the company before construction or sale of securities could begin.

Ballot Taken on Sick Benefit

Members of the Mutual Benefit Association of the Kimberly-Clark Corporation at its various mills have been conducting an informative ballot on proposals to increase the daily benefits for sickness, and on and off duty accidents, or leave the scale where it is at present. The results of the voting will be a guide to representatives of the employees on the Association board in formulating future policies. The ballot is not mandatory.

Traffic Lights at Lakeview Mill

As a safety measure, Kimberly-Clark has requested the highway committee of Winnebago County to install traffic lights at its Lakeview mill thoroughfare at Neenah, Wis. These lights would be operated during changes of shift, when 400 employees are leaving the plant or coming on duty.

Paper Men Hosts at Club Dinner

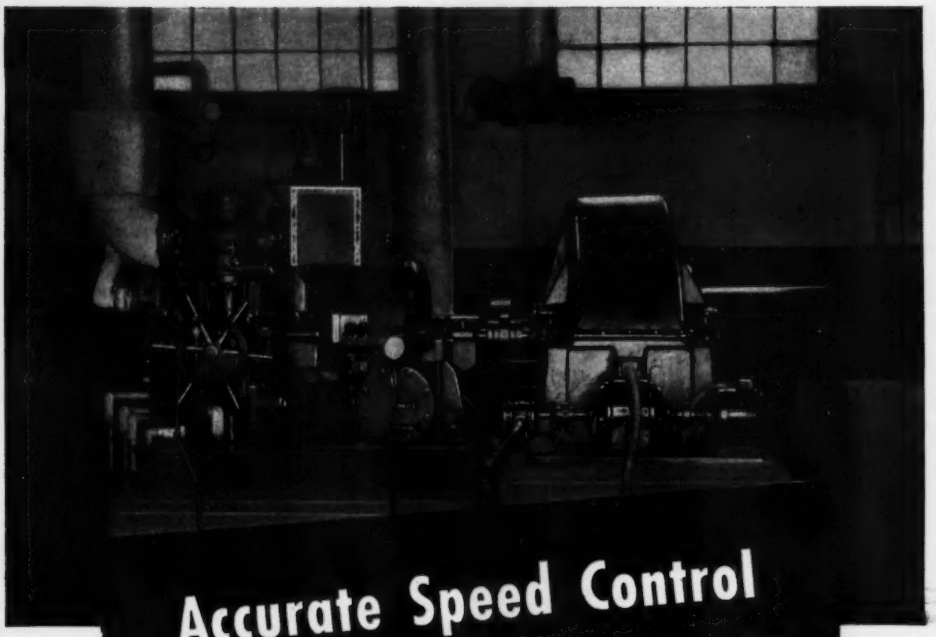
Two paper manufacturers, F. J. Sensenbrenner, president of Kimberly-Clark Corporation, Neenah, Wis., and D. C. Everest, president of the Marathon Paper Mills Company, Rothschild, were among the business men who served as hosts at a dinner of the Tax Foundation at the Milwaukee Club, Milwaukee, Wis., September 14. The principal speaker was Lewis H. Brown, president of Johns-Manville Corporation, New York.

Hoffmaster-Gillingham Nuptials

Byron T. Hoffmaster, sales representative of the Menasha Products division of the Marathon Paper Mills Company, Menasha, Wis., and Miss Janet Gillingham, Neenah, Wis., were married September 9 at the home of the bride. The couple will reside after a honeymoon trip to New York City at 485 Riverway, Menasha.

To Be Purchasing Agent for Powell River

VANCOUVER, B. C., September 11, 1939—R. A. Baker has been appointed as purchasing agent for the Powell River Company Ltd., Power River, B. C., according to an announcement by D. A. Evans, resident manager at the big pulp and paper mills.



Accurate Speed Control 24 HOURS A DAY with the G-E Electric Governor

Photo courtesy Oxford Paper Co., Rumford, Maine

THAT has been the experience of the Oxford Paper Company, Rumford, Maine, with an electric-governor-equipped G-E turbine for paper-machine drive. In addition, operation over the entire 6-to-1 speed range has been extremely flexible—speed changes are made easily and with minimum lost production time. Here's another mill in the ever-growing list that is taking advantage of the accurate, dependable driving power of G-E turbines equipped with the electric governor for paper-machine drive.

The G-E electric governor eliminates speed "drift." It provides constant speed at any point within the speed range of the turbine. Moreover, you are assured of low maintenance costs, minimum paper breakage at all operating speeds, and greater uniformity of product.

This 350-hp G-E turbine was installed late in August, 1938. Since that time it has operated 24 hours a day, six days a week. Steam is supplied to the turbine at 120 pounds gage with 50 degrees of superheat, and exhausts to the dryers at 10 pounds gage. Since all the low-pressure steam is required for drying, mechanical power for driving the paper machine is obtained as a by-product at low cost.

For details concerning the G-E electric governor and turbines for paper mills, consult the specialist at the nearest G-E office. He will be glad to help you. General Electric Company, Schenectady, N.Y.

GENERAL ELECTRIC

Chicago Reports Paper Prices About Normal

Increased Wholesale Buying In Midwest Area Apparently Merely Seasonal With Prices Not Yet Out of Line Despite Firmer Market — Scott Co. Plans Sales Expansion — Paper Milk Containers Termed Practical.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., September 18, 1939—A Chicago paper market which gave some evidences of boiling upward last week seems to have retained a greater measure of normalcy as an absence of hysteria has become more noticeable. Chicago paper executives are now examining the underlying strength of the paper market in its relation to the normal seasonal improvement which can be expected at this time. Some of these executives indicate that an examination of the buying by printers and by the jobbing houses proves their point that prices are little if any out of line and that in the great majority of the cases the firming up has been merited. An increase from 5¾ to 6 in the number three and four grades of sulphites is given as an indication of this fact.

Specifically, outside of the sulphite changes as above the price situation locally is reported about as it was last week with certain markets quoting prices in application with no open price prevailing. White papers in general have shown little change except for a genuine firmness in demand extending through the book and cover market. Newsprint expects more demand based on reports of increased advertising lineage. Groundwoods show a firm tone as do the waste papers which many consider a good criterion of market conditions. Mills, in general continue to be swamped with orders according to local reports.

Scott Plans Sales Expansion

The Scott Paper Company held a regional sales meeting in Chicago on September 7 with salesmen from the Chicago, Detroit and Great Lakes divisions on hand. During the meeting Harry C. Pardee, advertising manager, announced that the company will consolidate gains in the consumer field with the largest fall and winter advertising campaign in its history. High quality, sound policies and consistent advertising were quoted by Mr. Pardee as attributes which have given Scott "leadership in the retail field". The new industrial department, with W. H. Collins in charge of its advertising, is also making material gains and the Scott Washroom Advisory Service is reported to be in for continuance on an even larger scale than in the past. This branch of the business embraces the services of 60 experts ready to place their extensive knowledge at the command of every employer to both further harmonious industrial relations and create greater plant efficiency. Surveys of industrial plants are made at the request of responsible company officers and the findings submitted confidentially to the officers requesting the study. The company has given an excellent example, according to industrial concerns, of a way in which personalized service can basically increase the consumption of paper in the United States.

Paper Milk Containers Called Practicable

Chicago's famous war in which the battle lines are paper containers versus the city council and board of health, went into advanced stages this week as expert testimony of bacteriologists pointed out that paper containers for milk were practicable and harmless. This testimony in the Fieldcrest Dairies suit against the city for an injunction restraining them from interfering with the use of the containers in Chicago, was the highlight of the week's battlefront. Dr. M. J. Prucha of the University of Illinois testified that he examined 200 paper containers and also 150 glass bottles and found the bacteria presence considerably greater among the bottles. He found that paper containers tended to kill bacteria and stated that nine hours after exposure to a bacteria culture the paper cartons he tested showed no traces of the germ. The hearing, a long and protracted affair which has certainly advertised the value of paper containers to Chicago's citizenry if it has done nothing else, is expected to be concluded this week.

Salesmen Plan Banner Outing

Anyone who feels that the midwest division of the Salesmen's Association of the Paper Industry is leaving any stone unturned to make its annual golf outing on September 21 a banner affair should examine the colorful broadside issued by G. A. Crafts, golf chairman. The broadside, in new "Nu-Color" process, utilizes about all the colors of the rainbow to give the particulars of the outing held in conjunction with the annual meeting of the National Paper Trade Association. It includes eight stanzas of "poetry", describes the luncheon, golf, dinner, prizes, entertainment and what have you and urges early reservations. More than one hundred golfers have already signified their intention of being on hand at Olympia Fields September 21. The chairman even guarantees the weather.

Expand Safety Work

The National Safety Council, with headquarters in Chicago, reports that Claims Manager J. J. Plzak of the Consolidated Water Power & Paper Company of Wisconsin Rapids, Wisconsin, has announced the employment of two full-time industrial nurses. One of the nurses will take care of duties at the Wisconsin Rapids mill while the other will have charge of cases arising in the Biron Mill nearby.

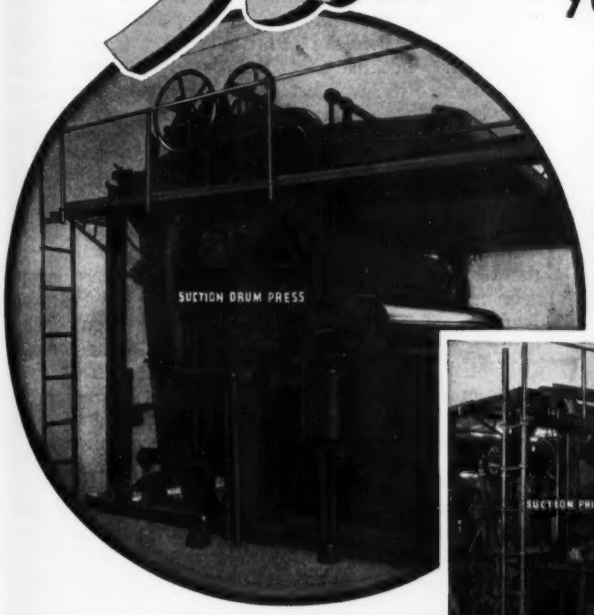
New Schedules at Container Corp. Plant

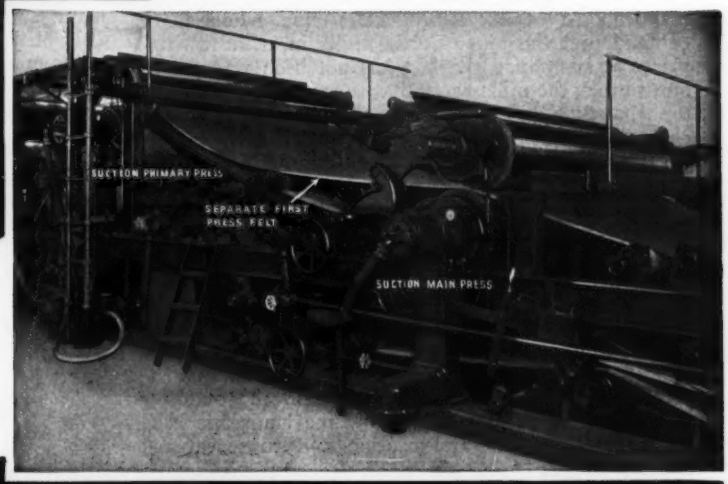
Two comparatively recent changes in the operations schedules of the Container Corporation of America directly affect the Chicago personnel. Wesley M. Dixon is now in full charge of the operations and sales of the coated board plant on 35th Street and Wabash while J. V. Spachner has assumed direct charge of the pulp mill at Fernandina, Florida, supervising both operations and sales. Mr. Spachner has assumed these duties in addition to a continuation of responsibilities in connection with the paper stock subsidiaries, purchasing and traffic divisions.

Suctionize

YOUR BOARD MACHINE WITH Beloit SUCTION

DRUM PRESS *
PRIMARY PRESS
MAIN PRESS





Note the short top felt for suction drum press nip. All plain primaries have been removed.

Wet pickup felt returns after suction primary press. Suction first press is on separate felt.

1. Removes large quantity water without disturbing formation or finish.
2. Reduces crushing and checking.
3. Improves finish. Reduces felt marks.
4. Permits use of light weight short top felt. Lower felt cost.
5. Eliminates several nips. Improves test of board.
6. Permits more bulk if desired.
7. Increases test or permits cheaper furnish and maintain same test.
8. Suction main press more efficient on separate felt.

* Suction drum press is equivalent to suction drum and suction primary press.

BELOIT IRON WORKS PAPER MACH'Y BELOIT WIS.

THE BELOIT WAY IS THE MODERN WAY

BELOIT IRON WORKS, BELOIT, WIS.

Toronto Withdraws Prevailing Paper Prices

All Quotations On Paper Except Newsprint and Wrapping Are Withdrawn By Mills and Jobbers — Orders Now Taken On Price At Time of Shipment—Favor Speedy Abitibi Reorganization—Other Industrial News

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., September 18, 1939—All prices on paper, except wrapping and newsprint, have been withdrawn by the mills and jobbers. Now all business is accepted on the figure prevailing at the time of shipment and subject to the mills accepting the business. The latter are very busy and some of them have orders ahead for a month or more. The mills state they have withdrawn prices due to conditions beyond their control but will in the meantime take orders for normal requirements at firm prices, subject to ability to make delivery within thirty days. It is the intention of every jobber and producer to take care of all the needs of their customers to the utmost of their resources subject to facilities to obtain raw materials and supplies necessary for the manufacture of their product. Some wholesalers contend that the move of the mills in withdrawing prices at such an early date has not been warranted but, to this, the mills reply that they have no guarantee what they will have to pay for pulp, paper stock, china clay, casein, dyes, and waste materials. Many factors enter into the situation and one effect is that the rush of buying orders, which were placed with wholesalers during the past few days, has ceased. Some customers wished to purchase enormous lots requesting delivery as speedily as possible. They were apprehensive that there would be changes in the sales tax and other burdens imposed on the trade. Had it not been for the outbreak of the war, there is a firm belief by many wholesalers that business would steadily have improved during the fall months as prices were regarded as stabilized and the outlook was getting steadily better. Now the landscape has taken another form and caution and conservatism is being urged.

Trade Better Organized Than in 1914

A quarter of a century ago, the market remained unchanged for several months but in the spring of 1915 prices began to ascend, with the revival of the printing and publishing trades, and continued well into the next year. Cheap bonds increased as much as three hundred per cent and there was a disposition to hoard stock in many instances. To prevent a runaway market and to guard against chaos, the present step in the withdrawing of all prices has been taken. As soon as the first spasm of fear is over, there are many who think that there will be no advance and that, at the end of 1939, barring totally unexpected developments, matters will remain much as they are. The future, of course, is very speculative. The paper trade, however, is well organized and does not look forward to disruption. As the days pass excitement engendered at first is slowly but surely disappearing.

The Abitibi Power & Paper Co., Limited, Toronto, reorganization may be assisted by conditions prevailing in Europe. About ten per cent of the newsprint imported by United States publishers is from Scandinavian countries. The fact that ships might be sunk crossing the Atlantic, combined with need for quick purchases in the near future, may increase the demand from American publishers on Canadian mills particularly because the public is buying more newspapers since the war broke out. The Abitibi five per cent bonds have been generally rising.

Paper Men in Government Posts

K. S. Maclachlan, who was for some years manager of the Lincoln Paper Company, St. Catharines, and later directed the affairs of the Alliance Paper Company, Merritton, Ont., has been appointed by the federal government to the post of acting deputy minister of the Canadian Department of National Defence. For years Mr. Maclachlan has been general manager of the Fraser Companies, Edmundston, N. B. Col. J. L. Ralston, who is widely known in legal, military and political circles, and is president of Canadian Paperboard, Limited, has entered the federal cabinet, Ottawa, as Minister of Finance.

Proposal To Use Old Abitibi Mill

A proposition has been made to the federal and provincial governments that the long, idle pulp and paper mill of the Abitibi Power and Paper Company, at Sturgeon Falls, Ont., should be converted into a war munitions plant. Major J. B. Allain, who has made the proposition, says that the plant has a floor space of about 125,000 square feet for manufacturing purposes and could easily be put into operation.

Big Cut of Pulpwood in Prospect

There is going to be a big cut this fall and winter of pulpwood in the northern and western parts of Ontario and especially in the Thunder Bay area. Three of the largest concerns in that district, will be the principal contractors. There will be nearly two thousand men in the bush. The Abitibi Power and Paper Company, Limited, will arrange for the cutting and purchasing of approximately 100,000 cords. Provincial Paper, Limited, Port Arthur division, will cut and buy about 60,000 cords and the Pigeon Timber Co., Port Arthur, will cut 30,000 cords about two thirds of which will be jackpine. Two of the companies will be operating in the Nipigon Forest area. Contracts have been with many farmers.

Favor Quick Reorganization of Abitibi Co.

It is now being urged that the Abitibi Power and Paper Company reorganization should be pushed as rapidly as possible under the Dominion Companies Creditors Arrangement Act. The Bradshaw-Ferguson-Scott plan as a basis of compromise of the various interests involved has now important support in the bondholders group and is accepted as basis in all other groups. The Ontario government for years has desired that the Abitibi Co. should be running under its own steam and direction, and now

that the outlook is visibly improving for the newsprint and other forest industries in Canada, it is regarded as highly important that something of this nature be done. On the Bradshaw plan, as in all plans drawn up to date, no sacrifice is asked of the bondholders. General creditors and equality shareholders interests have fought every plan that jeopardizes their equity in whatever the company may be able to do in the near future and, on this point, they are more determined than ever, now that the future looks brighter. Whatever merit they may have been in the contentions of the official bondholders committee headed by H. J. Symington, K. C. and formerly headed by J. P. Ripley, of New York, who is still a very active member, it is said they will see force in the view that the declaration of war by Canada places the United States in a special position of trustee toward the interests of such of its citizens as devote their time and effort to furthering the common cause whether at home or abroad on the battle field. It is believed that some of these creditors and shareholders will be in that position and courts and governments may reasonably be expected to hold that nobody be "sold out" when he is doing his bit.

It is further contended that a declaration of the official attitude of the Ontario government under the new circumstances would have a clarifying effect. None of the equity groups and few of the bondholders want a long drawn out battle as it would do neither the province nor the company one bit of good. A hearty accord on a fair basis would be welcome.

Pulpwood Prices More Firm

The prices of pulpwood in view of war condition are beginning to strengthen and it would not be surprising if higher figures prevail. Those jobbers, who had large stocks on hand, are not now anxious to sell and as it is expected the coming year will be a busy one with the paper mills. Shipments of wood which have been delayed along the T and N O railway in Northern Ontario are being made. Some of the wood, according to Toronto purchasers and handlers, has been in pile for nearly two years as the mills had large stocks on hand and were slow about taking delivery. This picture is now being changed.

J. P. Smith Appointed Manager

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., September 11, 1939—John P. Schmidt, who, for upwards of thirty years, has been connected with Thomas W. Price Company, has been appointed general manager of this company. Mr. Schmidt succeeds George Ernest, who has asked for a leave of absence because of ill health. Mr. Ernest was very popular with the trade, and it is hoped by all his friends that he will very speedily regain his health and be back in the harness. William A. Hentz, sales manager for a number of years, and vice-president of the board of governors of the Paper Trade Association of Philadelphia, has tendered his resignation to the company.

The congratulations of the trade are being extended to Mr. Schmidt, who has come up from the ranks, having started as a salesman, and at the time Mr. Ernest was made general manager, Mr. Schmidt was appointed as his assistant.

Philadelphia Association Meets

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., September 11, 1939—Meeting for the first time in its new headquarters, now located in Room 631 Drexel Building, the Paper Trade Association of Philadelphia elected E. T. Walter of Wilcox-Walter-Furlong Paper Company, vice-president of the board of governors of the fine paper division, which office was vacated by the recent resignation of William A. Hentz. At this same meeting, Ralph Luff of D. L. Ward Paper Company, was elected to the board of governors. The resignation of William A. Hentz, who, until recently, was connected with the Thos. W. Price Paper Company, was received with much regret.

On September 6th there was a general meeting of the Paper Trade Association of Philadelphia, at which Messrs. Walter and Luff were inducted into office, after which there was an open discussion on the effects of war on the paper business. Among those who participated were Norbert A. Considine, president of the Paper House of Pennsylvania, and a former president of the Phila. Paper Trade Assn.; George H. Weaver, vice-president of Garrett-Buchanan Company; Ralph Luff, D. L. Ward Paper Company; Nathaniel Saxe of Saxe Paper Company; and E. T. Walker, Wilcox-Walter-Furlong, who recounted for the benefit of the membership their experiences in similar situations.

The 42-hour week law, which becomes effective under the Wage and Hour Bill after October 24th, was discussed at length. Philadelphia for the most part has been working on a 44-hour week, and some twenty paper merchants among those present, representing the fine and wrapping paper division, expressed their desire to work a 5-day week—Monday through Friday inclusive, closing all day Saturday; in other words, continue the regular summer schedule of closing on Saturday all day from Labor Day on, rather than staggering the hours.

Paper Products for Household Use

Extensive increase in the use of paper cups, plates, spoons and napkins in United States households and restaurants is creating a rapidly growing new industry in this country, according to a report of the Forest Products Division of the Department of Commerce.

In 1937, the latest year for which statistics are available, over $13,600,000 paper cups were produced, 84 per cent of which were the round type, and the remainder of the flat paper variety. These were widely used in homes, restaurants, public fountains and business establishments, and created a relatively large industry in this product.

Paper dishes and spoons valued at $3,000,000 were produced in 1937, an increase of more than 57 per cent over the production in 1933. Paper napkins, production of which was valued at about $11,000,000 in 1937, showed a 69 per cent increase in production over 1933. Paper towels, valued in 1937 at $12,000,000, showed an 84 per cent increase in production over 1933.

A large increase in the production of paper bags and boxes was noted in 1937 as compared with 1933. Value of bags produced in the periods compared rose from $57,000,000 to almost $100,000,000; while the value of paper boxes and containers increased from $254,000,000 to $442,000,000.

New Literature

Stainless steel castings is the subject of a folder issued by the Atlas Stainless Steel Castings Division of Atlas Foundry Company, Irvington, N. J. Various characteristics of stainless steel castings and uses of this metal in the paper and other industries are given.

Rockwood paper pulleys for industrial use are described in a new booklet issued by the Rockwood Manufacturing Company, 1801-2001 English avenue, Indianapolis, Ind. This publication is particularly useful for all interested in plant equipment and maintenance and describes the various types of Rockwood pulleys and their applications with current prices.

Rockwood pivoted motor drives are described in Booklet No. 861, which provides information based on successful installations of this type of short-center drive. Prices and dimensions for various types of bases are given.

Boiler refractories is a new publication issued by the General Refractories Company, Philadelphia, Pa. It contains information on boiler refractory selection and construction, standards of the American Society of Testing Materials and tables for refractory use.

Adsco piston ring expansion joint is described in Bulletin No. 35-15A issued by the American District Steam Company, North Tonawanda, N. Y. The Adsco joint is recommended for use on high or low pressure pipe lines where continuous service is required. The joint may be unpacked and repacked without shutting off steam pressure or interrupting service.

Hydrojet ash handling systems are described in a new Catalogue No. 639M issued by the Allen-Sherman-Hoff Company, 225 South 15th street, Philadelphia, Pa. Hydrojet systems provide for the continuous storage of ashes accumulating over a considerable period and their periodic removal in the shortest possible time. Enclosure of the system from the furnace to point of disposal, assures cleanliness and complete safety, while the sealed ash storage hopper prevents entrance of excess air to the furnace.

Hill heavy duty hydraulic precision surface grinders are described in Bulletin H-V-1 just issued by the Hill Clutch Machine and Foundry Company, 6400 Breakwater avenue, Cleveland, O. The merits of both the horizontal and vertical spindle types are described, featuring simplicity, ruggedness combined with accuracy. The fully hydraulic table drive operates on low pressure, without gears and with finger touch and automatic control.

Years of Paper issued August 15 by the Crown Zellerbach Corporation, San Francisco, Calif., pays a tribute to Otto Erickson, 71-year-old millwright who now wears a diamond-studded service pin of the Crown Zellerbach Corporation to mark fifty years of continuous service in a single paper mill at West Linn, Oregon.

Nichols Freeman vortrap classifier is described in Bulletin No. 209 issued by the Nichols Engineering and Research Corporation, 60 Wall Tower, New York. Installations of the vortrap classifier for the removal of grit, scale and general dirt from papermaking stock in mills of Champion Paper and Fibre Company, The Becket Paper Company, Marathon Paper Mills Company, Hammermill Paper Company, and Canada Paper Company, are shown.

Peerless pumps, oil or water lubricated, are described in Catalogue No. 127A issued by the Peerless Pump Division of Food Machinery Corporation, 301 West avenue 26, Los Angeles, Calif. The full Peerless pump line is covered, including the new Hi-lift pump. Ten different types of turbine pump heads are shown in detail with pages of engineering data, views and methods of installation.

A new 172 page vest pocket catalog which illustrates and describes the 176 different materials handling devices in the Barrett materials handling equipment line is just off the press. Besides their line of lift trucks, portable elevators and container storage systems, it shows the new recently introduced Barrett torpedo electric hoists. Designated Junior Catalog No. 639, copies are available upon request from the Barrett-Cravens Company, 3255 W. 30th street, Chicago, Ill.

Paper Mills Get Rush Orders

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., September 11, 1939—The European situation brought about rush orders to main offices of paper mills here as well as to representatives of paper mills in larger volume than in the previous week, with prices becoming firmer and advancing. Mills have withdrawn previous prices.

Box boards came in for their share as well.

Paper stock business was exceedingly good. Indications are that consumers will depend very largely on domestic material. Foreign paper stock from England, France, Holland and Belgium cannot be imported without a license. The big advance in ocean freight rates is another difficulty.

N. E. TAPPI and Superintendents Meet

The New England Section of the Technical Association of the Pulp and Paper Industry and the Connecticut Valley Division of the Superintendents Association will meet at the Pittsfield Country Club, Pittsfield, Mass., Saturday, September 30, 1939.

There will be a golf tournament in the afternoon to play for the TAPPI and Superintendents cups and other trophies. There will be a bridge party for the ladies.

Dinner will be served at the Country Club at 6:30 P. M., following which F. K. Becker, vice president of the Bird Machine Company will talk on "The Removal of Dirt from Papermaking Stuff".

Union Bag Employs More Men

HUDSON FALLS, N. Y., September 18, 1939—The Union Bag and Paper Company is recalling to work many of its employees who were laid off during the depression. Increased business is causing the concern to speed up production. Both the Fenimore and Allen division already are running on a seven-day schedule to keep up with the increased volume of orders.

G. C. Andrews Returns To Duties

BOSTON, Mass., September 18, 1939.—George C. Andrews, vice-president and sales manager of the Monadnock Paper Mills, Bennington, N. H., has returned to his duties at the office of the company here after a long illness, following an operation.

Scott Paper Co. Continues Its Expansion

Improvements and Extension of Plant Facilities of Scott Paper Co. Steadily Continues—Redeems $750,000 Worth of Bonds In 1939—New Filter Plant To Cost $235,000 — Employees Benefit By Group Life Insurance.

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., September 18, 1939—Sales of Scott Paper Company, Chester, Pa., for eight months 1939 amounted to $11,829,244, an increase of 8.3 per cent over the corresponding period of 1938, Thomas B. McCabe, President, announced during the week. Average weekly production in July and August exceeded by 7.4 per cent the average for the second quarter and by 13.8 per cent the average for the first quarter of 1939. Some reduction in unfilled orders on file has been made possible.

Raw Material Situation of Company Good

Commenting upon the raw material situation of the company, Mr. McCabe pointed out that Scott Paper Company has a substantial inventory and is assured that, subject to some interruptions, shipments of contracts from Scandinavian suppliers will continue, and added that "the company was also fortunate in that the Brunswick Pulp and Paper Company, of Brunswick, Georgia, in which we own half interest and half of whose output is available to us, is now producing in substantial volume, and if need be, its facilities can be expanded; likewise, the operations of our small ground wood plant in Nova Scotia."

Continuing, Mr. McCabe said: "Our purchases of wood pulp from domestic suppliers have been steadily increasing and only recently contracts for a large tonnage were made. Scott Paper Company, therefore, is in a strong position to meet the present situation and to continue to give its customers excellent qualities and values."

Large Part of Debenture Bonds Redeemed

In July Scott Paper Company elected to redeem $500,000 principal amount of its 3¼ per cent Debenture Bonds on September 1, 1939. During this period, the holders of 490 of the 500 bonds called for redemption converted their holdings into Common Shares, leaving only $10,000 principal amount to be redeemed.

During 1939 the Company has elected to redeem $750,000 principal amount of its bonds. Of this amount only $17,000 was not presented for conversion. Bond conversions have totaled $1,900,000 during eight months, 1939. The funded debt of the Company has been reduced from $2,812,000 as of January 1, to $895,000 as of September 1, 1939.

In order to maintain the high quality of Scott Tissues, an abundant supply of clear, pure water is essential. The new machine now under construction will be the third in a little over two years. Since each uses hundreds of thousands of gallons of water daily, a new filter plant, assuring an ample pure water supply for the mill, has become a necessity. Work has begun on a new filter plant, with a capacity of 12 million gallons every 24 hours. The present filter plant has a 6½ million gallon capacity.

New Filter Plant to Cost $235,000

The new filter plant, sufficient to supply filtered water for a city of 150,000 people, will consist of two huge Accekator tanks where raw water is first treated chemically, and eight sand and gravel filter beds, each with a daily capacity of 1½ million gallons. Water will be pumped from the Delaware River by two pumps, each having a capacity of 8,400 gallons per minute. After passing through the filtering process, the water will be delivered to the paper mill as pure and as clear as the best drinking water. The new filter plant will cost about $235,000.

Employees Benefit by Group Insurance

Since April 28, 1927, the employees of the Company have had the benefit of group life insurance through the Scot-Tissue Beneficial Association which provides, in addition to such insurance, certain hospitalization and surgical payments in the event of illness. Subsequently, more than $102,000 has been paid to beneficiaries of deceased or permanently disabled employees.

While these payments have been of considerable help, yet in every case there was evidenced a need for a larger amount of insurance. After careful study, a plan for making additional insurance available to Scott employees was announced July 19. Under this plan all male employees who have been with the company six months or more are eligible to enroll for additional insurance. Female employees of six months' standing whose average weekly earnings are $30.00 or more, may also participate. For those women who are ineligible or who do not elect to avail themselves of this insurance plan, the Beneficial Association dues have been reduced ten cents a week. Enrollment of seventy-five per cent of eligible employees was required to make the plan effective. Of the 948 persons eligible under the plan, 802 or 84.6 per cent have enrolled. More than $1,641,000 of new insurance has been added to the $2,063,500 of insurance which was already in force under the original plan.

Employees may purchase, under the new program, additional insurance ranging from $1,000 to $8,000, according to weekly earnings. The Company pays the entire premium on the first $500.00 of additional insurance and a substantial portion of the premium on the balance for which the employee subscribes. The entire cost of administering the plan is borne by the Company.

Wood Pulp Production for 1938

Wood pulp production for the United States during 1938 aggregated 5,933,560 tons with an f.o.b. mill value of $180,394,204, according to a report released today by the Bureau of the Census, Department of Commerce. This was a decrease in the quantity produced of 9.7 per cent as compared with 1937.

Pulp wood consumed during the year amounted to 9,193,991 cords, the value of which was $74,433,-181. Of the latter amount, domestic spruce provided $17,249,767; Southern yellow pine, $17,570,346; and domestic hemlock, $11,124,455.

Financial News of Pulp and Paper Industry

Papercrafters Incorporate For $75,000—Increased Income and Sales For Remington Rand — Explains St. Regis and Taggart Connection — Rayonier Opens Kalamazoo Sales Office — New Paper Co. Near Pensacola.

New York Stock Exchange

High, Low and Last for the Week Ending September 20, 1939

	High	Low	Last
A. P. W.	3¼	2⅜	2¾
Armstrong Cork Co.	39¼	35½	38
Celotex Corp.	11	9⅞	9⅞
Celotex Corp., pf.	62½	60	62
Certain-Teed Products Corp.	7¾	6¾	6⅞
Certain-Teed Products Corp., pf.	29	25¾	26¾
Champion Paper & Fibre Co.	28	24½	26⅝
Congoleum-Nairn Co.	22½	20¾	21½
Container Corp. of America	15½	13⅞	14⅞
Continental-Diamond Fibre Co.	7⅞	7	7⅜
Crown-Zellerbach Co.	15⅜	14¼	15
Crown-Zellerbach Co., pf.	85½	84	85
Flintkote Co.	19½	17⅛	17½
Robert Gair	4¾	3¾	4½
Robert Gair, pf.	13¾	12	13
International Paper & Power	13⅜	11⅛	12⅜
International Paper & Power, pf.	45⅜	40	44⅜
Johns-Manville Corp.	80	76½	79
Kimberly Clark Corp.	33¾	31¼	32¼
MacAndrews & Forbes	30	30	30
Masonite Corp.	35¾	32½	32½
Mead Corp.	13¾	11⅜	13
Mead Corp., pf.	52	52	52
Paraffine Companies, Inc.	40⅛	38½	39
Ruberoid Co.	22	20¼	20¼
Scott Paper Co.	45½	44½	45⅛
Sutherland Paper Co.	25	24¼	24½
Union Bag & Paper Corp.	11⅝	10	11¼
United Paperboard Co.	6⅜	5¾	6¼
U. S. Gypsum Co.	74	70⅛	70⅛
U. S. Gypsum Co., pf.	159	158¾	159

New York Curb Exchange

High, Low and Last for the Week Ending September 20, 1939

	High	Low	Last
American Box Board Co.	7½	7	7½
Brown Co., pf.	19	18¾	18¾
Great Northern Paper	42	40	41
St. Regis Paper Co.	3⅞	3⅜	3⅞
St. Regis Paper Co., pf.	58	58	58
Taggart Corp.	4⅞	4¼	4¼

Papercrafters Incorporates

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, Mass., September 18, 1939—Announcement was made this week of the incorporation of the Papercrafters, New York, Inc., the charter for which sets capital at $75.000. The company is formed by the Papercrafters, Inc., of this city for distribution of its line of school supplies and other converted products in Metropolitan New York. Both Papercrafter organizations are closely allied to the Reynolds Manufacturing company of this city. Wellington G. Reynolds is treasurer of all three companies. Other officers of the New York concern are N. Stuart Reynolds, South Hadley, assistant treasurer; John M. Reynolds of Longmeadow, president; incorporators and directors, Joseph F. Pelletrau, Jackson Heights, N. Y., and Arthur T. Bracken, Bronx, N. Y.

Remington Rand Earns $150,332

Remington Rand, Inc., and its domestic and wholly owned foreign subsidiaries showed a net income of $150,332 in the quarter ended on June 30, after depreciation, income taxes, interest and other charges, according to the company's statement for the first quarter of its fiscal year issued yesterday by S. M. Knapp, executive vice president.

The result is equivalent to 81 cents each on the 184,931 shares of $4.50 preferred stock and compares with a net income of $93,152 or 50 cents a preferred share shown in the June quarter of 1938.

Net sales for the three months ended on June 30, last, increased to $10,098,336 from $9,612,940 in the corresponding period a year ago.

The company also announced that it had lowered prices on its electric shavers.

St. Regis and Taggart Connection

[FROM OUR REGULAR CORRESPONDENT]

CARTHAGE, N. Y., September 18, 1939—A meeting of business men was held here this week at which the principal speaker was William R. Adams, general manager of the Taggart Brothers Corporation. He explained the connection between the St. Regis Paper Company and the Taggart concern, stating they were closely related. He said that the twenty-seven per cent of stock which St. Regis owns in the Taggart Corporation indicates that the former controls the patents on machines which manufacture paper bags. Mr. Adams showed several exhibits of valve bags which are fast becoming popular and are being made by the concern. He believes that new developments in the South will not interfere with the local paper manufacturing business for the present.

Rayonier Incorporated Expands

Rayonier Incorporated, with headquarters in San Francisco, Cal., and mills in Washington and Florida, announces the opening of a branch paper pulp sales office September 15, in Kalamazoo, Mich. T. R. Wilbert, well known in the pulp field, will be in charge of this office.

Rayonier, experienced in the technique of manufacturing both dissolving and high-grade paper pulps, is keeping abreast of the ever-increasing trend for quality pulps in the paper field.

New Paper Company Formed

A press dispatch from Mobile, Ala., September 14, announced the organization of a $3,000,000 company to build and operate a paper mill near Pensacola, Fla. The company is being formed by John C. and A. D. Pace of Pensacola, who own large tracts of timber in Northeast Florida, and James H. Allen, former vice president and manager of the Union Bag and Paper Company of Savannah, Ga.

West Virginia Nets $400,289

West Virginia Pulp and Paper Company and subsidiaries for the nine months ended July 31, report a net profit of $400,289, equal to $2.57 each on 155,830 shares of 6 per cent cumulative preferred stock, compared with $231,782, or $1.49 each on 155,830 preferred shares in nine months ended July 31, 1938.

How Does America Stand About Supplying Additional Orders in the Export Field?

New York, September 11, 1939

Editor PAPER TRADE JOURNAL:

In the wild speculation that is going on at present in the stock market on such commodities as copper, oil, sugar, cotton, etc. the paper merchant and the paper mill men can look with envy on these commodities which are so essential to the prosecution of a succeessful war, but what of the paper and pulp business?

Here in New York we have many arguments that during the last world war America was called upon to supply the paper needs of all countries outside the war. Two of the largest buyers of American paper during the world war were China and Japan who at present are not interested in purchasing paper but only ammunition, and with China out of the market entirely as far as her civil population goes, she is not going to be a good customer. First, because the interior of China is engaged in preserving the lives of her people and feeding them, if possible, and she hasn't the money to buy our products, particularly, as her exchange has gone down to ridiculously low levels, so, American products today have advanced nearly 300 per cent over previous prices.

Japan is in a titanic struggle to win the war in China, and after two years of bitter strife she has not accomplished her ends. The importation of paper into Japan has been limited to almost the vanishing point.

Regarding Latin America: Last year Germany passed Great Britain as Latin America's greatest shop-keeper next to the United States, and was catching up with this country. The German barter system suited most of the South American countries. They swapped raw materials for finished goods and considered themselves the gainers.

Loss of the German markets and supplies means serious economic and financial dislocation for all of them, especially, Argentina, Bolivia, Chile, Colombia, Guatemala, Mexico, Peru, Uruguay and Brazil. Before the war started these Latin American countries were looking imploringly to the United States for economic stabilization as well as supplies. Their exchanges have been in a hopeless muddle, in some instances, before they had limited the importation of American products because we were unable to purchase from them sufficient to cover payment for what they needed here. Naturally, one would think that now all raw materials in Latin America would be consumed in the near future by the nations at war, but these raw materials are wool, cotton, oil, coffee, etc. and are products of which we have a superabundance. We are not going to purchase large quantities for any depleted stock in this country. We want to get rid of our surpluses too.

The United States, as soon as it dawned upon us that we were neutral, invalidated orders for some $200,000,000 worth of goods placed by France and Great Britain before the war started, such as aviation supplies, etc.

Hardest hit by the war and closest to home is Mexico which has been trading the oil from expropriated properties to the Nazis for whatever they could get in return. Our sales to Mexico dropped tremendously because the exchange of Mexican pesos to American dollars went from 3.60 to $1 down to 6 to 1 and even as low as 7 to 1.

The Central American republics were selling their coffee to Germany in exchange for commodities they could get. There is no doubt these countries would like to buy in the United States but with our huge surplus of raw materials undigested, we cannot buy larger quantities of coffee, sugar, wool, beef and other commodities until we get rid of our surpluses, so, Latin America, although willing to buy, cannot buy any more than she can pay for.

Exchange difficulties: During the first few days we have seen Canadian exchange drop from 6 per cent to 10 per cent depreciation which means a sharp advance of American materials when shipped to Canada and the likelihood is Canadian exchange may go still lower. Now, if we had higher prices to our products and the Canadian, in turn, must pay a higher exchange, he is going to curb his purchases. Even if Canada is going to be disturbed by many of their workmen being called to the colors, not only have we a huge unemployment problem but Canada also and could, if short of workmen, readily employ American workmen in their plants to take the place of soldiers. With the advantage of 10 per cent or 12 per cent depreciation in exchange she has that advantage in foreign trade, and I mean now, paper, that she never has enjoyed before.

On European exchange the pound sterling is down to 4.05 which is a drop from 4.68 and all British colony exchange has dropped correspondingly. Therefore, American goods are that much higher when the British wish to purchase here and with any increase in price on the American product it makes it that much more expensive, therefore, increased sales, except essentials, will naturally be curtailed. In the last world war we had a reverse situation, pound sterling was at a premium and merchandise could be purchased cheaper here than in most any other country, yet, the war boom anticipated did not really come until America entered the war.

In addition to this Scandinavian countries are not in the war, neither is Belgium, Holland and Denmark, and all of these are countries manufacturing paper and their exchanges have dropped in sympathy with the pound sterling. Unless Germany adopts ruthless submarine destruction of shipping, Norway, Holland and Belgium have plenty of ships to sell their products where they get the most for them and the prospect of getting gold or merchandise from Germany while the war is in progress is extremely limited and they naturally in conjunction with Scandinavian countries will turn to the country where they can get merchandise or gold in payment of their surplus commodities. They will limit the shipments to Germany, naturally, because Germany has nothing to pay for their products and there will be serious competition from them for the world markets.

If they sell to us in their local currency, the price will be extremely low compared with American prices

and if they sell in dollars the reverse is true because when converted into local currency they get 10 per cent to 12 per cent more than they were getting. There will undoubtedly be an advance in freight rates but these have not, as yet, occurred. War risk insurance likewise must be considered but this is trifling today for the neutral bottoms. The rates except through the Baltic will be less than 1 per cent. Regarding shipments from the Baltic, we received a letter from one of the largest exporters in Finland reading as follows:

"No doubt you are wondering whether the European situation will have any effect on shipments from . . . . You will be glad to learn . . . . cabled that they have been assured by all steamship lines they employ that they expect and intend to continue service without interruption.

. . . . have long shipped almost exclusively by American and other neutral lines; hence, we confidently anticipate continuing business as usual, although some irregularities in shipments may occasionally be unavoidable."

Therefore, let's pause and reason whether we will get any increase in business for the next six months to a year. Undoubtedly firms will try to cover but if prices will go up, the business will revert to countries not engaged in the war and until the foreign countries are properly financed, no matter how willing they are to buy, they will have to arrange credits either with our banks or our government for what they may need, so, at the most American firms will wake up with a heartache and headache as a result of the world conflagration and wonder where this big business anticipated was really coming from.

WALKER GOULARD PLEHN CO.

Newsprint Prices Unchanged

R. J. Cullen, president of the International Paper Company, announced on September 14 that the company is announcing to its domestic newsprint customers that, taking advantage of inventories on hand, present prices will be protected without change throughout the first three months of 1940. While it is impossible under existing conditions to make at this time any specific commitment beyond that date, it is hoped that a firm price for the coming six months will be reassuring to publishers and will demonstrate the company's desire to maintain an orderly market. For the future, prices for newsprint will be indicated just as far in advance as possible and will be made in the light of conditions as they develop, always recognizing that the interests of our customers as well as ourselves demand as large a degree of stability as can be preserved.

Salesmen Plan Golf Outing

The golf committee of the Salesmen's Association of the Paper Industry, 122 East 42nd street, New York, of which E. R. Lyman is chairman, has arranged with the Paper and Twine Club and New York Paper Trade Association for another joint golf outing at Bethpage State Park, Long Island, on Wednesday, September 20.

The cost of $5 includes locker, greens fees and a fine sirloin steak dinner. Tickets for non-golfers, including dinner and door prize is $2.50. Early reservations are requested.

Government Paper Bids

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 20, 1939—The Government Printing Office has received the following bids for 40,000 pounds of No. 32 yellow sulphite writing paper; Perkins-Goodwin Company, 4.83 cents; Old Dominion Paper Company, 4.838 cents; Mathers-Lamm Paper Company, 4.95 cents; Marquette Paper Company, 4.98 cents; Stanford Paper Company, 5 cents; Barton, Duer & Koch Paper Company, 4.72 cents; Butler Company, 5.4 cents.

For 25,000 sheets of 24 x 36 white cloth lined paper; Resolute Paper Products Company, $90.93 less 2 per cent, per M sheets; Thomas Barrett & Sons, $89.00; Cauthorne Paper Company, $88.35; Nashuan Gummed & Coated Paper Company, $93.65 less 2 per cent; Walker, Goulard Plehn Company, $92.35 less 2 per cent; Mathers-Lamm Paper Company, $88.35; Virginia Paper Company, $88.50; Middlesex Products Corp. $86.00 less 2 per cent; Andrews Paper House of York, $88.35; Whitaker Paper Company, $86.14; and Mudge Paper Company, $85.83.

For 17,302 pounds (82,000 sheets) 44 x 56 buff sulphite writing paper; Mathers-Lamm Paper Company, 5.04 cents; Marquette Paper Company, 5.3 cents; Barton, Duer & Koch Paper Company, 5.14 cents; R. P. Andrews Paper Company, 8.82 cents; Mudge Paper Company, 5.04 cents; Cauthorne Paper Company, 4.96 cents; and Old Dominion Paper Company, 5.147 cents.

Bowling League Opens Season

The fourth season of the Paper Industry Bowling League was gotten under way Monday evening, September 11th at the Bowlmor Bowling Recreation Alleys, New York.

Two new teams, representing Marquardt & Company and Coy, Disbrow & Company, both of New York, were welcomed into the league this season. The league is now comprised of sixteen paper companies. James A. Burke of Walker-Goulard-Plehn Company, and president of the league officially started the season and welcomed the two new companies into the league.

One minute's silence was observed by all members before starting bowling, in memory of Mr. Joseph Godwin, deceased. Mr. Godwin was an official of Bulkley, Dunton & Company and a real friend and supporter of the league. His death was the loss of a good friend and enthusiast for the league.

All paper men are invited to drop in at the Bowlmor Alleys, 13th street and University place, New York, any Monday evening between 6:00 P.M. and 8:15 P. M. and say "hello" or just "kibitz."

Sweden Restricts Exportation of Pulp

Effective September 11, 1939, the exportation of iron ore, iron and steel, lumber, wood pulp, newsprint and other staple products from Sweden has been made subject to permit, according to a cablegram received in the Department of Commerce from the American Legation, Stockholm.

Lumber and wood pulp had been exempted from the export restriction imposed by the Swedish royal decree effective August 29, 1939.

Obituary

Donald M. Weston

Donald Mitchell Weston, president of the Byron Weston Paper Company at Dalton, Mass., died at Pittsfield, Mass., on September 9, after a short illness at his home, Holmesdale. He was 48 years old.

Mr. Weston had been connected for the last twenty-five years with the company, manufacturing ledger and other papers, founded by his father in 1865. He was born in Dalton on April 10, 1891, the son of Byron and Julia Mitchell Weston. His father was at one time Lieutenant Governor of Massachusetts.

He was graduated from the Sheffield Scientific School at Yale University in 1914 and at once entered the firm. During the war he served overseas for two years as a first lieutenant in the Seventh Field Artillery. After the war he continued in the firm's employ, and in 1934 he was elected president to succeed his older brother, Philip Weston. He was the youngest of ten children.

Mr. Weston was a polo enthusiast and after he had purchased historic Holmesdale, his estate here, from Marshall R. Kernochan of New York in 1928, he established a polo field on it. He was a founder and former president of the Pittsfield Riding and Polo Club, which held several of its annual horse shows at his place, and he was a founder of the Pittsfield Polo Club which only recently won the New England championship.

He married the former Miss Mary L. Church, daughter of Mr. and Mrs. John H. C. Church of Great Barrington, in 1922. She suvives, as well as their three children, Donald M. Jr., Peter Bryant and Miss Joan Weston.

Theodore W. Johnston

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., September 11, 1939—Theodore W. Johnston, of the Thos. W. Price Paper Company, died at his home 11 W. Walnut Lane, on the night of August 24th. His wife, Anna A., who was hastening to the bedside of Mr. Johnston from their summer home in Ocean City, N. J., was taken ill on the train and expired, neither being aware of each other's passing.

Mr. Johnston, who was 72, had been with the Thos. W. Price Company for 55 years, and contributed in no small measure in sharing the honors with the men who helped build up the company to its present high position in the trade. He was one of the best known paper salesmen in the Philadelphia area and his passing is deeply regretted by all those who were privileged to know him.

Mr. Johnston was treasurer of the Bookbinders' and Paper Rulers' Division of the Typothetae of Philadelphia, having been reelected to that post at the organization's last annual meeting, May 9.

James S. Danehy

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., September 11, 1939—One of the most dynamic members of Chicago's coarse paper industry, James S. Danehy, general manager of the Schwarz Paper Company, died at the Illinois Central Hospital on August 23. Death came following an emergency operation and pneumonia which later developed. Funeral services for the well known paper executive were held on August 26 and were widely attended by those who had so long and favorably known Mr. Danehy in association and business connections. "Jim" Danehy was a leader in the wrapping paper industry and his death at the untimely age of fifty-one years deprives the industry of a leader who had made marked contributions to the development of cooperative effort in the wrapping paper field. For more than twenty years the Schwarz executive was secretary-treasurer of the Chicago Paper Association, being re-elected year after year as a tribute to his unfailing ability and willingness to carry out his own beliefs as to coopeative effort in fighting for better competitive conditions. S. L. Schwarz, president of the company, is reported to have taken over the general managership duties which Mr. Danehy so ably handled during a good share of the twenty-nine years he spent with the firm. His only other business connection, incidentally, was with the Fisher Bros. Paper Company with whom he became identified shortly after leaving school.

John J. White

[FROM OUR REGULAR CORRESPONDENT]

CANTON, Mass., September 18, 1939—John J. White, 59, president and treasurer of the J. J. White Paper Company in Canton, died September 16 after an illness of several months at his home, 55 Beaumont street.

Funeral services were held today at 9 A. M., with a solemn high mass at St. John's Church. Burial will be in Mt. Wollaston cemetery, Quincy.

Mr. White was born in Quincy and came to Canton 30 years ago to establish the firm which now bears his name. His wife, the former Mary Harkins of Quincy, died two years ago. He leaves a brother, Peter White, of Andover.

George E. Bardwell

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, Mass., September 18, 1939—George E. Bardwell, 64, of 295 Beech street, treasurer of the Carew Manufacturing Company of South Hadley Falls, paper manufacturer, died suddenly in his office Friday afternoon, September 15. Medical examiner Henry Doonan said a heart attack was the cause.

Mr. Bardwell was born in South Hadley Falls, Feb. 22, 1875. He started early in the paper making business. He was in the Buffalo office of the American Writing Paper Corporation for six years and then came back to enter the employ of the Carew Company. He had been treasurer for a number of years. He was a deacon in the second Congregational Church.

He leaves his widow, Mary (Allen) Bardwell, and two brothers, Fred L. Bardwell of Springfield and Harry L. Bardwell of Holyoke. The funeral was held from the Skinner Chapel Sunday afternoon.

G. P. Lee with Parker-Young

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., September 18, 1939.—George P. Lee, formerly vice-president in charge of sales of the Eastern Manufacturing Company, now the Eastern Corporation, became sales manager of Parker-Young Company, of Lincoln, N. H., on September 5, with headquarters at the main office here.

The Expression of *p*H As An Arithmetic Quantity

By Lewis B. Miller[1]

Abstract

The logarithmic method of expressing hydrogen ion concentration by means of the symbol pH may sometimes prove confusing. An arithmetic system of expression at times possesses advantages over the logarithmic method. The symbols A_H and A_{OH} are recommended for the terms Active Acidity and Active Alkalinity, respectively. The terms active acidity and active alkalinity, previously suggested and defined by other writers, are here defined strictly on the basis of hydrogen and hydroxyl ion concentrations. A table of equivalent values in which active acidity and active alkalinity are expressed in both logarithmic terms and in familiar arithmetic terms, is presented.

In 1909, Sorenson developed the relationship existing between the electrical potential set up by a hydrogen electrode and the concentration of hydrogen ion present in the solution being measured by the hydrogen electrode and found that, the logarithm of the reciprocal of the hydrogen ion concentration is directly proportional to the electrical potential. He suggested a symbol, later slightly modified to *p*H, to express this relationship. This symbol has become firmly established in technical and scientific literature. Unfortunately, many who make use of the symbol forget or are unaware of the logarithmic nature of the symbol and its significance. The result is that *p*H is treated as an arithmetic quantity with resultant misunderstanding among laymen and occasional unscientific use by technical men.

Active Acidity and Active Alkalinity

Many years ago Wherry *(1)* pointed out the objections to and the misuse of the symbol, *p*H, and suggested the use of the terms *active acidity* and *active alkalinity* for expressing the equivalent of the term, *p*H, in an arithmetic manner. More recently Booth has applied Wherry's idea to the expression of these quantities in paper manufacture. The importance of expressing the equivalent of *p*H in a simple, arithmetic manner as advocated by Booth and Wherry, particularly where the term is made use of by the nontechnical man, can hardly be over-estimated and will assist greatly in the general understanding of the significance of this term. There are, however, one or two objections to the arithmetic system employed by Booth and Wherry.

In his recent paper Booth *(2)* uses the symbol AA to express both active acidity and active alkalinity, the latter being designated as a negative term to differentiate it from active acidity. This symbolism is open to one of the objections which has been raised to the symbol, *p*H, namely, that it emphasizes only hydrogen ion concentration as the positive and important quantity. It may, also, be confusing at times to represent two different quantities (active acidity and active alkalinity) by the single symbol, AA. It is therefore suggested that two symbols be used to express these quantities: A_H for active acidity and A_{OH} for active alkalinity.

In his latest exposition of this subject *(3)* Wherry considers active acidity and hydrion concentrations, referred to 10^{-7} as a unit, to be identical from regions of low *p*H to a *p*H of 6.6. Between *p*H values of 6.6 to 7.0, he indicates the active acidities to be less than the hydrogen ion concentrations since in this range (in accordance with the relation *p*H = 1/COH) the hydroxyl ion concentration becomes high enough to exhibit a neutralizing effect. By inference active acidity is defined according to Wherry, therefore, as the difference between hydrogen and hydroxyl ion concentrations and extends from regions of high acidity down to a *p*H of 7.0 at which point both active acidity and active alkalinity are zero. The same line of reasoning is used by Wherry in the expression of active alkalinity. This method of expression will be easily understood by a study of Table I taken from Wherry's article.

In this table Wherry by definition, indicates which of the two ions (hydrogen ion or hydroxyl ion) is in preponderance and the degree to which the ion in question preponderates over the other. This method

[1] Member TAPPI, Chemical Engineer, Keasbey & Mattison Co., Ambler, Pa.

TABLE II.—*p*H EXPRESSED IN VARIOUS UNITS OF HYDRO

*p*H	A_H Active acidity	A_{OH} Active alkalinity	Hydrogen ion concentration in gram mols per liter	Hydroxyl ion concentration in gram mols per liter	Hydrogen ion concentration in gram mols per liter expressed in powers of 10	Hydroxyl ion concentration in gram mols per liter expressed in powers of 10
0	10,000,000.	0.000,000,1	1.0	0.000,000,000,000,01	10^{0}	10^{-14}
1	1,000,000.	0.000,001	0.1	0.000,000,000,000,1	10^{-1}	10^{-13}
2	100,000.	0.000,01	0.01	0.000,000,000,001	10^{-2}	10^{-12}
3	10,000.	0.000,1	0.001	0.000,000,000,01	10^{-3}	10^{-11}
4	1,000.	0.001	0.000,1	0.000,000,000,1	10^{-4}	10^{-10}
5	100.	0.01	0.000,01	0.000,000,001	10^{-5}	10^{-9}
6	10.	0.1	0.000,001	0.000,000,01	10^{-6}	10^{-8}
7	1.	1.	0.000,000,1	0.000,000,1	10^{-7}	10^{-7}
8	0.1	10.	0.000,000,01	0.000,001	10^{-8}	10^{-6}
9	0.01	100.	0.000,000,001	0.000,01	10^{-9}	10^{-5}
10	0.001	1,000.	0.000,000,000,1	0.000,1	10^{-10}	10^{-4}
11	0.000,1	10,000.	0.000,000,000,01	0.001	10^{-11}	10^{-3}
12	0.000,01	100,000.	0.000,000,000,001	0.01	10^{-12}	10^{-2}
13	0.000,001	1,000,000.	0.000,000,000,000,1	0.1	10^{-13}	10^{-1}
14	0.000,000,1	10,000,000.	0.000,000,000,000,01	1.	10^{-14}	10^{0}

* Where a weight basis is used instead of a weight to volume basis the figures given are strictly true only in solutions with a unit density. For practical purposes, however, they may be considered sufficiently accurate.

TABLE I.—COMPARISON OF METHODS OF STATING REACTIONS

pH	Active acidity	pH	Active alkalinity
3.0	10,000	7.0	0.0 neutral
4.0	1,000	7.1	0.5
5.0	100	7.2	1.0
6.0	10	7.3	1.5
6.1	8	7.4	2
6.2	6	7.5	3
6.3	5	7.6	4
6.4	4	7.7	5
6.5	3	7.8	6
6.6	2	7.9	8
6.7	1.5	8.0	10
6.8	1.0	9.0	100
6.9	0.5	10.0	1,000
7.0	0.0 neutral	11.0	10,000

of expression is open to the objection that it might be inferred from it that below a *p*H of 7.0 there are no hydroxyl ions present and above a *p*H of 7.0 there are no hydrogen ions present. This concept will, of course, offer no problem to the physical chemist who will promptly recall the basic equation:

$$C_H \times C_{OH} = K_W = 10^{-14}$$

It may prove confusing to others not equally trained who may wonder how the hydroxides of ion, aluminum, etc. can be precipitated in the form of flocs in the *p*H range of 4.0 to 6.0 when no hydroxyl ions are present. This method of expression, also, negatives one of the most valuable and important concepts emphasized by the *p*H system, namely, that hydrogen ion (and of course, hydroxyl ion as well) is present throughout the *p*H range from high acidities to high alkalinities.

Definitions and Symbols

In order to avoid the objections raised to the system of Wherry and the symbols of Booth the following symbols and definitions are submitted

Active acidity is defined as the hydrogen ion concentration in mols per liter, referred to 10^{-7} as unity, throughout the *p*H range and is designated by the symbol A_H.

Active Alkalinity is defined as the hydroxyl ion concentration in mols per liter, referred to 10^{-7} as a unit, throughout the *p*H range and is designated by the symbol A_{OH}.

There are any number of other units by which active acidity and active alkalinity may be expressed in addition to the unit defined above. The unit chosen here merely indicates at a glance on an arithmetic basis, relative numerical concentrations of hydrogen or hydroxyl ion present at different *p*H values. In order to make the chosen system of expression as clear as possible and to render the chosen unit in terms familiar to all, the *p*H scale is expressed in several units in Table II.

Conclusion

It is believed that the acceptance of the symbols A_H and A_{OH} for active acidity and active alkalinity, respectively, will remove any confusion which might have arisen in the use of these terms, if the original symbols previously suggested had been retained. The expression of these terms over the *p*H range from 0 to 14 in equivalent units commonly in use in several fields of activity should indicate clearly the relationship between the logarithmic and arithmetic methods of expression and should clearly define the expressions active acidity and active alkalinity in familiar terms.

Bibliography

(1) Wherry, E. T. *Am. J. Pharm.* 99:342 (1927).
(2) Booth, L. M. *Tech. Assoc. Papers* 22:189-193 (1939).
(3) Wherry, E. T. *Am. Hort. Soc. Bull.* 4:3 (1926).

Outlook in Northern New York Improves

[FROM OUR REGULAR CORRESPONDENT]

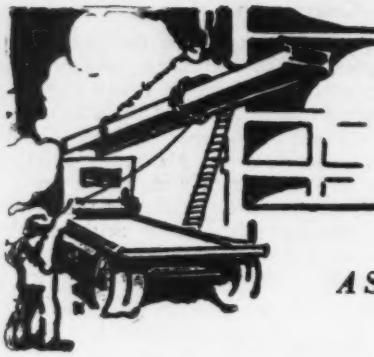
DEXTER, N. Y., September 18, 1939—The business outlook in Northern New York has become much brighter. Evidence of the increased rail traffic was manifested early this week when fifty-six carloads of newsprint, most of it consigned to South America, passed through this section from Canada on its way to the Metropolis for export. Most of that cargo, valued at about $70,000 was manufactured at Iroquois Falls, Ont., by the Canadian International Paper Co. Ordinarily that concern sends the paper to Three Rivers, P. Q., and then forwards it by water to Argentina. Because of the limited imports of sulphite pulp, the Dexter Sulphite Pulp and Paper Company is expected to increase its output. The principal business of that company is the sale of wood pulp and the demands upon it of course will be greater, it is expected. Shipments of newsprint are also likely to increase. As paper mills increase their output they naturally use more bituminous coal and that adds to the volume of tonnage on the railroads. Heavy shipments of bituminous will probably be made into this section.

Finland Resumes Exports of Paper

A cable from Helsingfors, Finland, under date of September 8 says that "Exports of timber, cellulose, paper and butter were resumed today when Finnish vessels received permission for passage through the German mine belt outside Danish waters with neutral cargoes."

GEN ION AND HYDROXYL ION CONCENTRATION

*p*H	Hydrogen ion concentration in p.p.m.	Hydroxyl ion concentration in p.p.m.	Hydrogen ion concentration in grains per gallon	Hydroxyl ion concentration in grains per gallon	Hydrogen ion concentration expressed in percentage by weight of the total solution	Hydroxyl ion concentration expressed in percentage by weight of the total solution
0	1,000.	0.000,000,000,17	59.	0.000,000,000,01	0.1	0.000,000,000,000.017
1	100.	0.000,000,001,7	5.9	0.000,000,000,1	0.01	0.000,000,000,000.17
2	10.	0.000,000,017	0.59	0.000,000,001	0.001	0.000,000,000,001.7
3	1.	0.000,000,17	0.059	0.000,000,01	0.000,1	0.000,000,000,017
4	0.1	0.000,001,7	0.005,9	0.000,000,1	0.000,01	0.000,000,000,17
5	0.01	0.000,017	0.000,59	0.000,001	0.000,001	0.000,000,001,7
6	0.001	0.000,17	0.000,059	0.000,01	0.000,000,1	0.000,000,017
7	0.000,1	0.001,7	0.000,005,9	0.000,1	0.000,000,01	0.000,000,17
8	0.000,01	0.017	0,000,000,59	0.001	0.000,000,001	0.000,001,7
9	0.000,001	0.17	0.000,000,059	0.01	0.000,000,000,1	0.000,017
10	0.000,000,1	1.7	0.000,000,005,9	0.1	0.000,000,000,01	0.000,17
11	0.000,000,01	17.	0.000,000,000,59	1.	0.000,000,000,001	0.001,7
12	0.000,000,001	170.	0.000,000,000,059	10.	0.000,000,000,000,1	0.017
13	0.000,000,000,1	1,700.	0.000,000,000,005,9	100.	0.000,000,000,000,01	0.17
14	0.000,000,000,01	17,000.	0.000,000,000,000,59	1,000.	0.000,000,000,000,001	1.7



CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Financing and Operation of Pulp and Paper Mills

General Construction News

Ashland, Wis.—The Marathon Paper Mills Company, manufacturer of tissue and crepe paper stocks, has approved plans for new addition to mill on East Twenty-third avenue, to be one-story, 80 x 100 feet. It is reported to cost over $40,000, with equipment. General erection contract has been awarded to the R. J. Murphy Company, Ashland, and work will be placed under way at once.

Atlanta, Ga.—The Atlanta Paper Company, 225 Moore street, S.E., commercial and other paper stocks, has completed plans for one-story addition to storage and distributing plant. It will be 100 x 175 feet, estimated to cost close to $50,000, with equipment. Contract for erection has been let to the Capitol Construction Company, 62 Bartow street, N.W., Atlanta, and work on superstructure is scheduled to begin at early date.

Everett, Mass.—C. G. Wood, Inc., 11-17 Parlin street, recently organized with capital of 100 shares of stock, no par value, plans operation of plant at location noted for the manufacture of corrugated and other boxes and containers. John C. Carr is president of new company, and Francis J. Carr, treasurer.

Portland, Ore.—The Crown Zellerbach Corporation, Fifth avenue and N.W. Everett street, manufacturer of paper products, has awarded general contract to Reimers & Jolivette, Inc., Railway Exchange Building, Portland, for proposed new addition to local plant, recently referred to in these columns, consisting of a two-story and basement building, 90 x 100 feet, with foundations for third story at later date, and for modernizing and improving present seven-story and basement structure. Work will be placed under way at once. Cost estimated over $125,000, instead of smaller amount previously noted. O. R. Johnson is resident engineer for company, in charge. Main offices are at 343 Sansome street, San Francisco, Cal.

Dover, N. J.—Commanding Officer, Ordnance Department, United States Army, Picatinny Arsenal, Dover, will receive bids until October 9 for complete equipment for manufacture of paper tubes, including one paper-cutting machine, one portable skiving machine, one sheet-coating machine and one tube-rolling machine, all as per Proposal 335.

Chicago, Ill.—Permalux Company, 833 West Washington boulevard, manufacturer of decalcomania paper goods, has leased space in the building at 900-10 West Lake street, totaling about 9000 square feet of floor space, and will remodel and equip for new processing and manufacturing plant. Present works will be removed to new location and capacity increased.

Rochester, N. Y.—The Eastman Kodak Company, Kodak Park, manufacturer of films, photographic papers, etc., has plans under way for new addition to local plant, consisting of a multi-story unit for large increased capacity, estimated to cost close to $300,000, with equipment. It is expected to begin work soon. Company has awarded contract for another addition to plant to Ridge Construction Company, Kodak Park, consisting of a one-story structure, estimated to cost about $50,000, with equipment. Superstructure is scheduled to be placed under way at once.

Fernandina, Fla.—Rayonier, Inc., 343 Sansome street, San Francisco, Calif., manufacturer of rayon pulp, etc., is proceeding with construction of new branch mill at Fernandina, consisting of group of one and multi-story structures, and proposes to have the plant ready for service by the close of this year, with operations scheduled to begin shortly thereafter. The new plant will specialize in the production of dissolving pulp materials, used in the manufacture of rayon, cellophane, etc., under a special process, utilizing Southern slash pine as raw material. A division also will be operated for the manufacture of paper grade pulps. As previously noted in these columns, the new mill will represent an ultimate investment of about $6,000,000, including buildings and machinery, and will have a rated capacity of approximately 180 tons of pulp per day. The Rust Engineering Company, Clark Building, Pittsburgh, Pa., is general contractor for erection.

Chicago, Ill.—The Mid-States Gummed Paper Company, 2433 South Damen avenue, manufacturer of gummed and other processed paper stocks, has arranged with the Reilly Tar and Chemical Corporation, 2513 South Damen avenue, owner of building at first noted address, occupied under lease by Mid-States company, for the construction of a top addition on present structure, 100 x 120 feet, and will occupy for expansion. Erection contract has been let to the B. W. Handler Construction Company, 1261 South State street, Chicago, and work is scheduled to begin at once. Cost estimated over $50,000, with equipment. I. H. Braun, 123 West Madison street, Chicago, is architect.

Federal, Ill.—The Alton Boxboard Company, Alton, Ill., manufacturer of container board, wall

board, straw board, etc., has plans under way for new addition to mill, to be one-story, estimated to cost close to $100,000, with equipment. A portion of structure will be used for storage and distributing service. It is proposed to begin work this fall. R. F. Hollis is chief engineer for company, in charge.

Detroit, Mich.—The Hinde & Dauch Paper Company, Sandusky, Ohio, manufacturer of corrugated shipping boxes and other paper containers, has completed construction of new branch mill on West Chicago boulevard, fronting on line of the Pennsylvania Railroad, in course of erection for several months, and has placed the unit in operation. Production will be stepped-up to maximum capacity at early date. As previously noted in these columns, the new plant is one-story, 200 x 510 feet, divided into two main units, and represents an investment of close to $500,000, including equipment. In addition to regular manufacture, the new mill will specialize in corrugated containers for shipping automobile parts and for kindred service.

New Companies

Ogdensburg, N. Y.—The Ogdensburg Paper and Glass Company has been chartered with capital of $15,000, to deal in wrapping papers and other commercial paper goods. New company is represented by Louis O. Weit, 232 Ford street, Ogdensburg, attorney.

Buffalo, N. Y.—Erie Waste Materials, Inc., has been incorporated with capital of 200 shares of stock, no par value, to deal in waste paper products. The incorporators are Samuel Curtis, Abraham Kerner and Joseph H. Reingold, 17 Court street, Buffalo. Last noted is attorney and representative.

New York, N. Y.—The Seaboard Lithograph Corporation has been chartered with capital of $20,000, to manufacture paper specialties. New company is represented by David H. Hausman, 512 Fifth avenue, New York, attorney.

Boston Reports Active Paper Demand

BOSTON, Mass., September 18, 1939.—Manufacturers both of fine and kraft papers, continued to have a rush of orders during the last week and have been compelled to make allotments to customers in proportionate amounts. Book paper mills, in some cases, at least, have been swamped with orders and in a number of instances have been obliged to decline business. Most of the tonnage has come from publishers. Printers, generally speaking, have been holding off. It is reported that if they are obliged to pay higher figures for paper, that they will pass along the advanced prices to their customers.

For the last two weeks, paper merchants have likewise been receiving urgent calls for paper. Some customers are ordering against price advances and some on account of shortage.

Prices of paper stock have been increasing, with dealers asking from $2 to $5 more a ton for their property. In some quarters it is reported that there are many inquiries but no business. It is suspected that there has been some speculative buying in paper stock.

The board market is "boiling," with chip board around $40 for spot shipment.

TO CONTROL EXPORTS

(Continued from page 9)

ship of a resident of Canada, shall be transferred to His Majesty in right of Canada, and shall pay compensation therefor.

Price of Newsprint Unchanged

Considerable interest has naturally been aroused here in the announcement of the International Paper Company that the price of newsprint to its domestic customers will remain at $50 per ton for the first quarter of 1940. No action has yet been taken here regarding price, owing to the fact that the industry has not yet had time to adjust itself to war conditions, and there are too many uncertain factors yet for any positive decision to be arrived at. It may be said, however, that producers here are thoroughly in agreement with the sentiment underlying the statement of R. J. Cullen, president of the International Company that "it is hoped the announcement of the company will be reassuring to publishers and will demonstrate the company's desire to maintain an orderly market". Producers here have already issued a joint statement asking publishers to assist them in maintaining an orderly market by abstaining from placing abnormally large orders for inventory purposes, and by ordering for normal requirements. They have emphasized the fact that they have all the capacity needed fully to care for all normal demands.

Honor for Paper Man

K. S. MacLachlan, president and managing director of the Fraser Companies, Limited, Edmunston, N. B., has been appointed acting deputy minister of the federal Department of National Defense. Mr. Fraser was born in Toronto 47 years ago. He attended the Model School, Jarvis Collegiate, St. Andrew's College and University of Toronto, graduating as a Bachelor of Science. He started his business career with Metals Chemical Co., Welland, in 1913. He then was employed by the National Synthetic Co. and in 1916 became supervisor of production and distribution of explosives for the Imperial Munitions Board.

Following the war Mr. MacLachlan engaged in various minor positions with the Lincoln Paper Co. He then became associated with R. Home Smith of Toronto. From 1925 to 1927 he was manager of Lincoln Paper Co. For the next three years he directed the affairs of Alliance Paper Co. and then became general manager of Fraser Cos.

His record in the pulp and paper field has proved clearly his ability as an organizer and practical operating man. He is regarded throughout the industry as a thoroughly sound businessman.

Holyoke Plants Step Production

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, Mass., September 18, 1939—Several plants of the American Writing Paper Corporation, and the plants of the Crockery-McElwain and Chemical Paper companies have stepped up production by scheduling a six-day week.

Large increases in orders have made this necessary and practically all plants hereabouts are accepting orders on the price-prevailing basis. To date there has been no increase in paper prices.

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

Henry J. Berger
EDITOR

Ronald G. Macdonald
Editor Technical Section

Lynne M. Lamm
Washington Correspondent

Vol. 109 New York, September 21, 1939 No. 12

COMING EVENTS IN PAPER INDUSTRY

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—Second Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

NATIONAL SAFETY COUNCIL, PAPER AND PULP SECTION, Annual Meeting, Atlantic City, N. J. October 16-20.

RAPID BUSINESS EXPANSION

Much concern has been expressed by economists and business men that a too rapid expansion of industry and trade is likely to cause considerable speculative activity which may result in a runaway market. Within the last few weeks the unstable state of political and economic conditions in Europe have affected the commerce of the world. Before the present upset in international relations general business activity in this country was increasing at a moderate rate. With the realization that normal industrial activity had largely ceased in England, France, and Germany, business activity here reacted in much the same manner as in 1914. Speculation in the securities and commodity markets followed and the problem of keeping business expansion under control again comes up for serious consideration.

A few weeks ago the Department of Justice was endeavoring to devise practical and advantageous laws to stimulate industrial and financial expansion, now it is studying how to control an expansion, which if unchecked, is likely to result in a period of great inflation, with the ultimate effect of ending as inflationary or boom periods have in the past, in severe deflation and another depression. To avoid this high peak of brief prosperity and the resulting dip to an abnormal level of business activity, is the problem now being studied by several government departments. With the steel industry now operating at under 70 per cent of capacity, the automobile industry at around 61 per cent, and the paper industry at around 80 per cent, there is, of course, room for expansion before inflation need be checked. The 10,000,000 American unemployed workers is also a deflationary or curbing factor.

But, there are factors present in the current complex business situation which are viewed as exerting a strong inflationary pressure. One of the most important of these is the huge volume of excess bank reserves that have long been idle while great efforts by the government have been made to make freer use of these unemployed funds. Another factor is the prospect that in some key industries supplies of skilled labor are small and might well be found inadequate to sustain a strong, rapid recovery. In that event it is viewed as likely that demands for higher wages would result in further demands for still higher wages and so lead to price inflation. The best time to apply control measures to check speculative excess is, of course, when any considerable degree of inflation starts and that is the common desire of government and leading business men and trade associations.

This country apparently is entering a period when control of business expansion and speculative activity will become more important than recovery, asserted Dr. B. H. Beckhart, secretary of the board of trustees of the Banking Research Fund of the Association of Reserve City Bankers, at the session of sales finance companies, held at the Hotel Pennsylvania on September 17. Dr. Bechhart declared that, until difficulties abroad are adjusted, the pattern of economic change here is likely to bear many similarities to that of 1915 and 1916. "We seem", he said, "to be entering upon one of those long-time swings in interest rates comparable to the two decades between 1900 and 1920. The bias of the Treasury will continue to be in the direction of maintaining easy money market conditions, but corrective action in increasing money rates may become imperative.

"Unless controls are imposed soon enough and drastically enough, we may experience a very unhealthy flare-up in business activity and sharp increases in commodity prices. The traditional means used to correct such a situation have been increases in the rate of interest. This implies that, in addition to those natural forces which are operating to bring about higher rates of interest, the monetary authorities themselves, however reluctant they may be to take action, will of necessity be forced to adopt policies that will cause corrective increases in rates of interest."

Dr. Jules I. Bogen, editor of the *Journal of Commerce,* described the current upswing in prices and business expansion as "inventory accumulation". In his opinion this stimulus may last six to nine months, to be followed by a letdown unless supported by durable goods. The extent of the present "boomlet", he compared with the inventory buying of 1936-37 and stated it was indicated in estimates that the Federal Reserve Board's index of production for this month will go to 110, against 102 in August,

"the largest single rise for any month since July, 1933".

Expressing optimism on the upswing in business, John W. Hanes, Under-Secretary of the Treasury said on September 16 that money was at last "coming out of the storm cellar", stating that he was "optimistic of the business outlook because the profit motive is returning, whereas in the last five years people were concerned chiefly with safety. This, together with such Treasury statistics as the upswing in miscellaneous revenues, indicates a healthy increase in the tone of business, in my opinion". He declared that industry would be wise, however, if it took steps to prevent the building up of "step-ladder prices" as was done twenty-five years ago. "It would be smart if it spread this thing out", he said, "by stepping up production and keeping down the cost per unit basis. In this way, public purchasing power would not be cramped by high prices to the consumer."

No Chemical Shortage

Although prices of some paper-making chemicals have advanced no shortage is considered probable in the chemical trade at this date of any paper-making material. Few changes in the list have occurred as yet, although prices of all raw materials in all markets are firm and the trend of all primary markets is upward. The trade reports that the supply of paper-making chemicals is ample. Casein appears to be an exception and is now reported as rather scarce and prices have been sharply upward this week. Quotations on all imported chemicals, including salt cake, are nominal. The trade reports that efforts are being made to discourage speculative buying and that supplies are being conserved to fully meet all regular industrial requirements.

In a statement made at the New York World's Fair on September 12, Lammot du Pont, president of E. I. du Pont de Nemours and Company, said in part: "The accomplishments which American chemists have achieved and the diversified chemical industry, which did not exist in 1914, is well organized, well equipped, well manned today. It stands as a solid guarantee of American self-sufficiency. Never again will our industrial production, which depends upon chemistry, be disrupted by conflicts beyond our shores. Never again will our people be deprived of many vital medicines for the preservation of health. American chemistry is ready—ready for 'the world of today and the world of tomorrow.'"

A. J. Crittenden To Be Superintendent

OGDENSBURG, N. Y., September 18, 1939—Announcement is made here of the appointment of A. J. Crittenden as superintendent at the Algonquin Paper Corporation. He has been connected with the paper manufacturing business for the past twenty years and until recently was a member of the staff of the International Paper Company at Dalhousie, N. B. He has already assumed his new duties at the paper mill division and he plans to make his home in this city. A. E. Bartlett will continue as general superintendent of the company.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association:

COMPARATIVE MONTHLY SUMMARIES[1]

Months	1939	1938	1937	1936	1935	1934
January	77.5%	63.9%	90.3%	76.1%	65.8%	.....
February	81.7%	68.7%	90.1%	77.9%	70.0%	.....
March	84.0%	69.6%	90.3%	76.0%	70.5%	.....
April	82.9%	68.3%	92.1%	82.3%	70.0%	.....
May	80.2%	69.0%	90.6%	81.6%	69.4%	.....
June	79.5%	66.0%	87.3%	80.7%	72.3%	.....
July	75.1%	72.0%	81.8%	77.3%	64.9%	.....
August	83.0%	77.2%	82.9%	81.5%	70.9%	.....
September	.....	76.3%	78.6%	80.5%	71.9%	58.2%
October	.....	82.5%	73.5%	87.6%	75.6%	64.7%
November	.....	79.6%	61.9%	88.0%	75.3%	61.7%
December	.....	74.4%	54.5%	85.9%	71.2%	59.6%
Year Average	.....	72.3%	80.6%	81.3%	70.5%	.....
First 36 weeks	80.5%	69.4%	87.4%	79.0%	69.0%	.....

COMPARATIVE WEEKLY SUMMARIES[1]

CURRENT WEEKS 1939		CORRESPONDING WEEKS, 1938	
August 5	80.5%	August 6	73.2%
August 12	82.9%	August 13	77.2%
August 19	82.9%	August 20	78.0%
August 26	83.4%	August 27	80.1%
September 2	85.4%	September 3	77.5%
September 9	72.1%	September 10	66.0%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting—Current Weeks					
Ratio Limits	Aug. 5, 1939	Aug. 12, 1939	Aug. 19, 1939	Aug. 26, 1939	Sept. 2, 1939	Sept. 9, 1939
0% to 50%	72	55	67	69	57	42
51% to 100%	234	251	236	232	234	151
Total Mills Reporting	306	306	303	301	291	193

PAPERBOARD OPERATING RATIOS

Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association:

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1935	62%	68%	68%	63%	61%	66%	62%
1936	62%	67%	67%	70%	69%	70%	69%
1937	80%	86%	86%	88%	85%	77%	66%
1938	54%	60%	61%	57%	58%	56%	57%
1939	60%	67%	71%	69%	64%	67%	63%

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1935	67%	71%	77%	71%	61%	66%
1936	75%	78%	82%	80%	74%	72%
1937	74%	69%	65%	55%	45%	73%
1938	66%	66%	70%	65%	59%	61%
1939	....	....	....	....	....	....

Week end. Aug. 5, 1939—70%
Week end. Aug. 12, 1939—71%
Week end. Aug. 19, 1939—72%
Week end. Aug. 26, 1939—72%
Week end. Sept. 2, 1939—73%
Week end. Sept. 9, 1939—63%

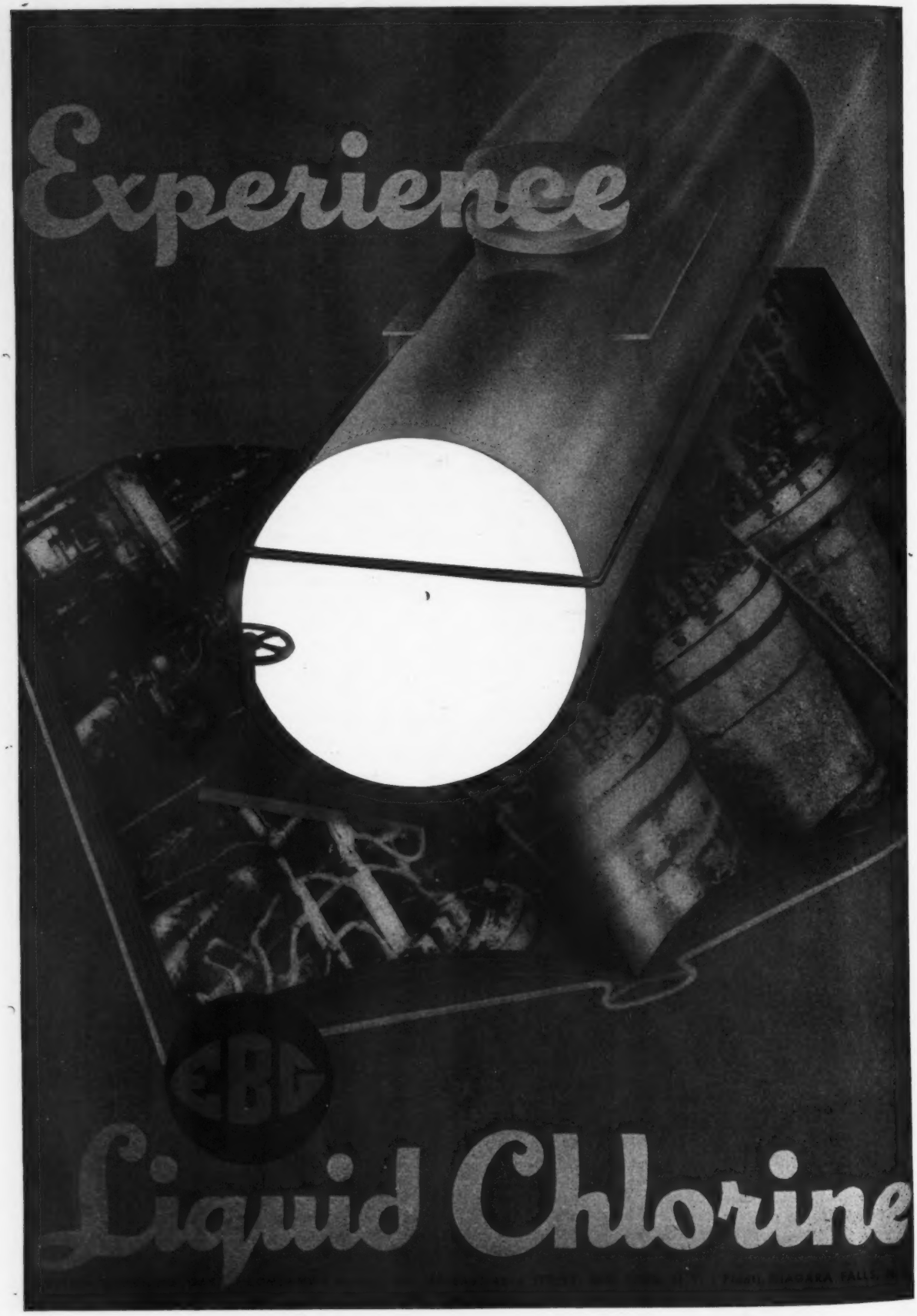
[1] Production-capacity ratios are based upon six-day capacity ratings which are adjusted periodically to correspond with the ratings reported by individual companies. Ratios are subject to revision until all reports are received.

To Head Farm Waste Studies

Dr. Elbert C. Lathrop, an authority on the commercial production of cellulose products, is to head the work on the industrial utilization of agricultural wastes at the Northern Region Research Laboratory of the Bureau of Agricultural Chemistry and Engineering, Dr. Henry G. Knight, chief of the bureau, announced last week. Doctor Lathrop's work is intended to develop new and improved methods for the production of cellulose products from such materials as stalks, straw, hulls, and cobs.

A graduate of De Pauw University and with a Ph. D. degree from American University, he did research in chemistry in the Department of Agriculture for many years and carried on investigations for several large industrial concerns.

In announcing the appointment, Doctor Knight called attention to the fact that Doctor Lathrop most recently has been vice-president in charge of technical activities of a large corporation, manufacturing cellulose products from farm wastes.


Experience
Liquid Chlorine

Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

Review Of The Paper Industry Literature

Abstracts Compiled By the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson, C. E. Peterson and Clarence J. West, Chairman.

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C., for 10 cents each. Send currency, not stamps.

Testing

Surface Tester. Fred H. Benjamin. U. S. pat. 2,113,290 (April 5, 1938).—The instrument is intended for testing the surface wear, more particularly of jute liner. It comprises two blocks around each of which the paper to be tested is attached. The lower block is stationary and the upper block, which is surmounted with a weighted platform, is reciprocated over the lower block. (Cl. 73-51)—A.P.-C.

A Reflectance Method for the Study of Discoloration of Artificially Aged Papers. John C. Tongren. Tech. Assoc. Papers 21:301-309 (June, 1938); Paper Trade J. 107, No. 8:34-42 (Aug. 25, 1938).—Discoloration of sized and unsized papers from chemical wood pulps was studied quantitatively by measuring heat aging effects with the General Electric Reflection Meter. Sized sheets discolor roughly half again as rapidly as unsized sheets. The rates of discoloration of sheets made from the same sulphite pulp subjected to various degrees of bleaching were roughly independent of the degree of bleaching. Removal of a portion of the natural resin from sulphite pulp by alcohol extraction tends to lower the discoloration rate. Purification of sulphite pulp by removing the bleach residues with caustic soda significantly decreases the rate of discoloration. At 25 per cent relative humidity and above, the rate of discoloration upon aging increases linearly with the relative humidity of the aging atmosphere at 100 degs.; the more rapid aging rates at the higher relative humidities are accompanied by an increase in the copper number.—A.P.-C.

Photoelectric Gloss Meter. Lynnville A. Carpenter and Ernest J. Schreiner, assignors to Oxford Paper Company. U. S. pat. 2,127,477 (Aug. 16, 1938).—The instrument comprises a casing in the top of which is an aperture over which may be placed a black glass plate. Inside the casing is a tube containing a source of light, inclined so that the beam of light strikes the glass plate at an angle of about 15°, and is reflected on to a photo-voltaic type of photocell mounted at the back of a tube inclined to the plate at an angle of about 15°. The cell is suitably connected to a galvanometer the circuit of which is provided with suitable adjustable resistances. With the light turned on and the black glass in position, the resistances are adjusted so that the galvanimeter reading is 100. The sample of paper to be tested is then placed under the black glass and the reading of the galvanometer gives the gloss directly in percentage. (Cl. 88-14)—A.P.-C.

Measuring the Absorptive Power of Paper Towards Printing Ink. B. I. Berezin. Bumazhnaya. Prom. 15, No. 2:70-72 (May, 1937); Chimie & Industrie 39:954 (May, 1938).—The method consists essentially in printing a weighed strip of the paper with a standard ink, removing the excess of ink by repeated contact with clean paper, and weighing again, the increase in weight corresponding to the ink absorbed. A two-roll press is used in carrying out the determination.—A.P.-C.

Biological Methods in Paper Diagnosis. H. N. Lee. Tech. Assoc. Papers 21:319-325 (June, 1938); Paper Trade J. 107, No. 6:33-39 (Aug. 11, 1938).—A brief outline of some possibilities of applying biological technique in the practical diagnosis of paper and in the investigation of paper problems: fiber analysis; orientation, beating and pressing; starch; rosin sizing; glue; writing and printing ink; waterproofing, and coating.—A.P.-C.

Apparatus for Measuring the Stiffness of Flexible Materials. Geo. H. Smith, assignor to Ralph F. Taber. U. S. pat. 2,113,389 (April 5, 1938).—The test strip is mounted vertically in a suitable yieldable holder. The top of the strip is deflected by means of a pivoted pointer which is moved manually over a suitably graduated scale to the position where the test strip disengages from the pointer and springs back. The scale is graduated on either side of the vertical, so that readings can be taken by bending the same strip in both directions. Means are provided for increasing the range of the instrument according to the type of material to be tested. A cutter is provided to enable the test strip to be cut to exactly the required length and width. (Cl. 265-17)—A.P.-C.

Bending Strength Tester for Cardboard, Etc. Lewis Howe. U. S. pat. 2,131,805 (Oct. 4, 1938).—The instrument comprises a rotary disc having a suitable scale around a portion of its periphery, and a ring-shaped piece around the disc, a suitable portion of the ring also being graduated. A weighted pendu-

lum arm with a pointer at the top is pivoted at the center of the disc so as to be rotatable independently of the disc. The latter carries two pins against which the test sample is laid and is held in place by means of a third pin connected by a small arm to the pendulum arm. Displacement of the disc causes the pendulum to exert a bending stress on the cardboard, the amount of bending being measured on one of the scales and the strength of the sample on the other. (Cl. 265-17)—A.P.-C.

Sample Holder. John H. Graff assignor to The Institute of Paper Chemistry. U. S. pat. 2,120,404 (June 14, 1938).—A sample holder for microscopes has a bed plate, the central portion of which is cut away to define a relatively wide slot, into which slides a rest plate. Under the latter is a spring urging it upwards. The sample (e.g., of paper) is placed on the rest plate and held firmly in position with its top surface flush with the top surface of the bed plate by means of a fork-shaped number that is pivotally supported on the bed plate and pressed down upon by means of a suitable spring. (Cl. 88-40)—A.P.-C.

Resistance to picking. Patra J. 2, No. 1:29-33 (July, 1938); B. I. P. C. 9:33.—A well known printing trouble is the picking of paper, resulting in small areas of the paper becoming detached from its surface during the printing operation, leaving white specks on the print and particles of the paper adhering to the block or rollers. The defect most frequently arises with coated papers and may be due to the paper, the use of too stiff an ink, or incorrect printing conditions, such as excessive speed, etc. The Bekk resistance-to-picking tester is used for evaluating this property in the laboratories of PATRA; this method is not entirely satisfactory, because small weak areas are not readily detected by the apparatus, and the means of applying the pulling force is not identical in actual printing and in the instrument. However, the apparatus will indicate which of two papers is the more likely to pick if printed under identical conditions with the same ink, and whether in an investigation the paper is to blame for the trouble or another condition is responsible.—C.J.W.

Photoelectric Method of Determining the Whiteness and Transparency of Paper. S. S. Kuvshinov. Bumazhnaya Prom. 16, no. 2:27-32 (1938); C. A. 32:7261.—The construction and use of a photoelectric apparatus are illustrated and described.—C.J.W.

Measurement of the Hardness or Compressibility of Paper; measurement of elasticity of paper; estimation of abrasive particles in paper. Patra J. 2, no. 2:72-7 (September, 1938). Brief descriptions are given of the Bekk hardness tester for measuring the compressibility and elasticity of paper, as well as of the Bekk scratch tester for estimating the amount of abrasive particles in paper, their mode of operation, and results to be obtained with these instruments.—C.J.W.

Deterioration of Paper as Indicated by Gas-Chamber Tests. T. D. Jarrell, J. M. Hankins and F. P. Veitch. U. S. Dept. Agr., Tech. Bull. 605, 21 p. 1938.—Sheets of various grades of paper were tightly bound in slotted "lock post" binders and exposed to the gaseous products of sulphur combustion for a maximum of 330 days at 29 per cent to 48 per cent relative humidity at 50 degs. C. Parallel exposures were made in sulphur-free air. In presence of sulphur gases there was marked deterioration at the edges of the sheets of all grades, "hard-finish" rag ledger and highly purified wood-fiber bond papers, containing 2.8% and 1.8% of glue, respectively, were least affected. Deterioration, however, progressively decreased as the distance from the edges increased. Deterioration was most strikingly indicated by drop in folding endurance, but also by changes in pH, water-soluble sulphates, copper number, and alpha-cellulose content of the paper. In sulphur-free air, papers with pH higher than 5.4, copper number less than 0.8, and alpha-cellulose content greater than 90 per cent showed a maximum deterioration of 8 per cent. The results confirm that absorption of acidic sulphur compounds is one of the most serious causes of deterioration of book and record papers, and it is suggested that neutralizing agents should be incorporated in the paper to assist their permanence.—A.P.-C.

Color Matching in the Paper Industry. E. L. Deeter. Electronics 11, no. 9:18-19 (Sept. 1938); B. I. P. C. 9:61.—Photographs, diagrams, and a brief description are given of an instrument intended "to designate color matches with high precision of colors or dyed papers by reflection or transmission methods."—C.J.W.

Fluffing Tendency. Patra J. 2, No. 1:33-35 (July, 1938); B. I. P. C. 9:33.—The presence of loose fibers on the surface of a sheet of paper is troublesome, in that it causes filling-up of half-tone blocks, scumming of lithographic plates, and defective printing. The PATRA laboratories use a modification of a method suggested by J. Grant for judging a paper for its tendency to fluff. An area of paper (10 s cm.) is examined microscopically, the number of protruding fibers counted, and the number of fibers per sq. cm. determined by calculation. The correct procedure is described in detail. The method is at present the best available for this purpose but not entirely free from criticism. The number of particles projecting from the paper surface is counted; however, it does not follow that all such particles will be detached when the paper is printed nor that all loose particles project from the surface of a paper. The results of the method must therefore be interpreted with caution, but it is usually safe to conclude that of two papers, the one with the higher fluff count will be more liable to cause fluffing troubles on the printing machine. PATRA is endeavoring to develop another method for measuring the fluffing tendencies of paper by placing the sheet under test in contact with a standard sticky surface and counting the number of fibers remaining behind when the paper is removed.—C.J.W.

Paper Specialties

Treatment of Paper. Brown Company. Fr. pat. 828,018 (May 9, 1938).—Dry paper containing no size, or only a small amount, is exposed to a temperature above 149 deg. C. (preferably 204 to 343 deg. C.) for a short time, e.g., 1 sec. The resistance of the paper to water is thus raised. Numerous details are given, and an apparatus is described.—A.P.-C.

Cork-Treated Paper Pulp. Louis L. Larson, assignor to Krafelt Corp. of America. U. S. pat. 2,121,703 (June 2, 1938).—In order to obtain a product suitable for making an absorbent, resilient paper and for effecting substantially uniform distribution of comminuted cork into paper pulp, there is mixed with the pulp an aqueous dispersion of cork in water containing a wetting agent and a dispersing agent. (Cl. 92-21)—A.P.-C.

Study of Friction Between Solid Surfaces and Moving Paper Stock Suspension*

By Paul C. Baldwin[1] and J. A. Van den Akker[2]

Abstract

The head-loss versus rate of flow curves for paper stock pumped through circular pipes are markedly dissimilar from those characterizing the flow of true liquids like water. Two important factors in the resistance to flow of paper stock through pipes are friction between the moving stock and the pipe wall and internal friction occurring in the stock at cleavage surfaces. Apparatus for measuring the corresponding "coefficients of friction" is described, and data on these coefficients for different pulps, velocities and consistencies are given. The relation of the data with head-loss versus rate of flow curves is discussed, and a theory of the flow of paper stock in pipes is presented.

Introduction

The need for data on the friction losses encountered in the flow of stocks in pipes became evident as the use of the centrifugal pump increased in pulp and paper mills. These pumps possess critical characteristics and a small range of capacity for efficient operation, and thus fairly exact data on the head loss which could be expected for the pumping of stock were desirable.

In the first installations the flow of stock was considered to be entirely analogous to that of water. Such assumptions, however, caused much embarrassment on the part of the engineers designing pumps and pipe lines for the movement of stock of high consistency. Considering the fact that hydraulic formulas are derived for true liquids, it is no wonder that the laws for the flow of water in pipes failed when applied to dense stock suspensions.

It is desirable to consider first some of the characteristics of high consistency stock suspensions and to note wherein they differ from the properties of true liquids. A liquid may be defined as a body made up of particles which become displaced relative to one another under the influence of very small forces, even though there is a certain amount of friction between the particles. Maxwell states that, if one layer of a liquid is moved relatively to another and parallel layer, the friction between the two layers is independent of the pressure but is proportional to the area of the shearing surface and to the difference in velocity. From this law it can be seen that successive layers of a liquid may possess different velocities and that the velocity of any individual particle will depend on the distance of its location from the boundary of the moving layer of which it is a part.

It is a well-known observation that stock in a beater will retain a sloping free surface. This fact alone shows that stock does not act as a true liquid. Sigurd Smith *(1)* has also pointed out that in the flow of stock in the beater trough the speed of the stock does not increase as the center of the trough is approached but apparently has a nearly constant velocity of flow over the entire cross section of the trough. This, also, is unlike the characteristics of water flowing in pipes or an open channel, for the speed of the water increases as the center of the stream is approached.

The first published measurements on the frictional resistance to pulp flow in pipes were made by Trimbey *(2)* in 1907. For many years Trimbey's data were used in the industry, but it was found for conditions other than those used in the tests, namely, groundwood pulp in spiral riveted pipes, that the data were not entirely satisfactory.

Since the time of Trimbey's work there have been other measurements made on the flow of different types of stock in different sizes and types of pipes. The most comprehensive of these were made by Forrest and Grierson *(3)* and Heller and Brecht *(4)*. The types of curves obtained by these investigators are illustrated by a series of curves published by the Allis-Chalmers Mfg. Company *(5)* shown in Fig. 1[3].

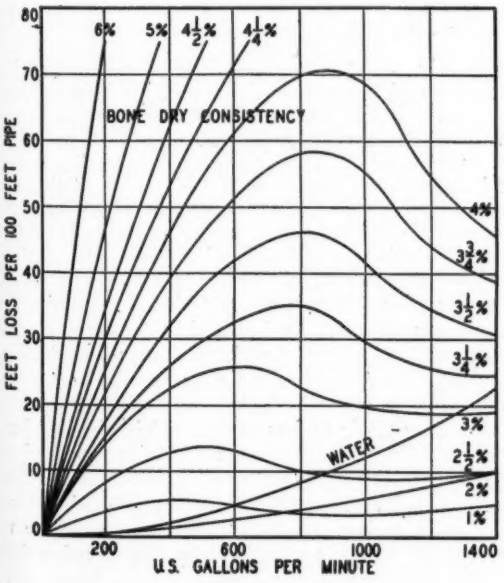


FIG. 1
Friction loss of sulphite stock through 6-inch cast-iron pipe (published by permission of Allis-Chalmers Mfg. Co.)

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Roosevelt Hotel, New York, N. Y., Feb. 20-23, 1939.
A portion of a thesis submitted by Paul C. Baldwin in partial fulfillment of the requirements of The Institute of Paper Chemistry for the Degree of Master of Science from Lawrence College, Appleton, Wisconsin, June, 1938.

[1] Graduate student, The Institute of Paper Chemistry, Appleton, Wisconsin.

[2] Research Associate and Instructor in Physics, The Institute of Paper Chemistry, Appleton, Wisconsin.

[3] From the discussion of Forrest and Grierson, it appears that the curves labeled 1 per cent and 2 per cent in Fig. 1 should be 2 per cent and 1 per cent, respectively.

These curves bring out two important points: (1) At high rates of flow and at low consistency the frictional head loss is noticeably less than that for water. This is explained by the fact that small amounts of fibers present in the suspension reduce turbulence. (2) Forrest and Grierson found that, for sulphite pulp, the frictional head loss rises to a maximum and then diminishes to a minimum and, as the flow increases, the friction head rises again. This was substantiated by Heller and Brecht who not only found it to be true for sulphite pulp but also for the other pulps tested.

From these facts, it can be concluded that the mechanism of the flow of stock in pipes is quite different from that of water. If the stock flows through the pipe as a plug with a constant velocity over the entire cross section, then the frictional head loss is entirely due to the friction at the stock-metal interface. If, on the other hand, there is a velocity gradient across the pipe, this loss must be due to both internal and surface friction.

Therefore, in order that an analysis of the mechanism of the flow of stock in pipes may be made, studies must be carried out on the friction of pulp against the metal surfaces in common use in paper and pulp mill piping systems over a range of velocities that will cover a good part of those used in the actual pumping of stock in industry. To analyze further the individual components, it is desirable to obtain some information on the friction of stock against stock with velocity as a variable. For this purpose, two special pieces of apparatus were constructed.

Apparatus

The apparatus for the determination of the friction of stock against a metal surface is pictured schematically in Fig. 2. In this apparatus a cylinder made of brass, cast iron, copper, or stainless steel rotated at various speeds in stock. The receptacle for the stock was a hollow brass cylinder mounted on a shaft held in ball bearings concentric with the rotating cylinder. A clock spring was fastened to the shaft and by measuring the deflection of the outer cylinder a measure of the friction of the metal surface against the stock was obtained.

In Fig. 2, A represents the outer brass cylinder which contained the stock. B is one of the cylinders rotating in the stock. Four cylinders were used in this apparatus; they were mounted on the shaft I by set screws. The cylinders were polished on a lathe with fine emery paper until reflections could be easily seen in their surfaces. C represents a stroboscopic disk which was fastened directly on the rotating shaft and illuminated by one electrode of a neon lamp. This was used to determine the speed of the rotating cylinder. A clock spring D was fastened to the shaft J so that the torque transmitted from the rotating cylinder could be measured in absolute units. This spring was calibrated to give torque in lb.-ft. per unit of displacement. The shaft J was mounted in ball bearings E to eliminate as much friction as possible.

The rotating cylinder was driven by a variable speed direct current motor (equipped with a reversing switch) by means of V-belt connection with the step pulley G. By means of a variable resistance across the armature of the motor its speed could be varied over a wide range.

A scale K, divided into millimeters, was placed around the circumference of the outer cylinder and, using the pointer L as a reference, the deflection of the outer cylinder was measured.

The apparatus for the determination of the friction of stock against stock is pictured schematically in Fig. 3. It consisted of a rotating cylinder made from a 12-inch section of a standard 4-inch cast-iron pipe. Mounted concentrically in this cylinder was a torque rod from which vanes protruded at 90-degree intervals, forming four quadrants. When the cast-iron cylinder was filled with stock and rotated, the stock cleaved at the ends of the vanes and a stock-against-stock interface was formed. The torque rod was mounted in ball bearings and was connected to a clock spring. By measuring the deflection of the torque rod the friction at the stock-stock interface could be determined.

In Fig. 3, A represents the rotating cast-iron cylinder which contains the stock. It was mounted on the shaft I by means of the set screws H located in the collar, as shown. There were three groups of set screws, two in a group, located around the collar at intervals of 120 degrees. By means of these set screws, the cylinder could be accurately centered, thus allowing it to rotate at reasonably high speeds without excessive vibration. The cylinder was driven by a variable speed D. C. motor through the step pulley G. The stroboscopic arrangement for determining the speed was the same as that in Fig. 1 except that the lines were placed on the circumference of the cast-iron cylinder instead of on a disk. The torque rod B was made of ⅜-inch brass rod, from which the vanes C protrude and was mounted in the ball bearings E. The vanes C were made of strips of brass 1⅜ inches long, ½-inch wide and ⅛-inch thick and were placed at 90-degree intervals around the rod. The clock spring D was attached to the torque rod so that the torque transmitted by the shearing force of the stock could be measured in absolute units. The spring was calibrated to give lb.-ft. per degree displacement. The pointer F was placed over a circular dial which was divided into 360 degrees.

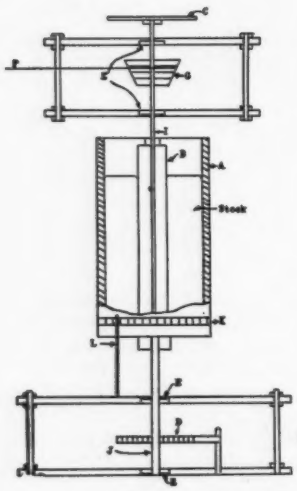


FIG. 2.

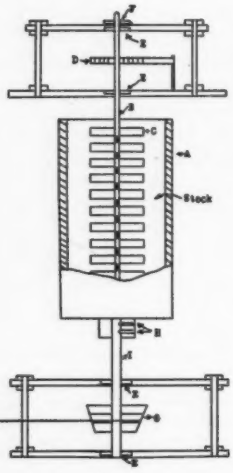


FIG. 3.

Fig. 2—Apparatus for the determination of the friction of stock against metal surfaces. Fig. 3—Apparatus for the determination of the internal friction of stock.

Determination of the Coefficient of Friction ϕ at the Stock-Metal Interface

When the cylinder B of Fig. 2 rotates in the stock, a torque will be set up as a result of frictional forces and this torque will be transmitted to the outer cylinder A. These frictional forces may be one of the following: (1) The frictional resistance at the stock-metal interface; (2) the internal friction of the stock; or (3) combination of 1 and 2.

Regardless of the origin of the friction it should be directly proportional to the area of the surface of the rotating cylinder, provided there is sufficient annular space between the concentric cylinders so that the effect of the outer cylinder is negligible.

Since the torque due to rotation of the inner cylinder is transmitted to the outer cylinder, the torque measured by the deflection of the outer cylinder against the clock spring must be equal to that exerted by the inner cylinder.

If ϕ is the coefficient of frictional resistance exerted at the stock-metal interface, then the torque exerted by the circumferential area of the cylinder will be:

$$L = \phi \cdot 2\pi R \cdot b \cdot R,$$

where L is the torque in pound-feet, ϕ is the coefficient of friction in pounds/square foot, R is the radius of the inner cylinder B (Fig. 2), b is the length of the inner cylinder B in feet.

If the coefficient of friction ϕ is considered to be constant with velocity, the torque exerted by the bottom of the inner cylinder B will be:

$$L = \phi \int_{\phi}^{R} 2\pi r^2 \, dr = (2/3)\pi\phi R^3 \ .$$

The total torque will then be:

$$L = \phi\ [2\pi bR^2 + (2/3)\pi R^3] \ , \text{ and}$$
$$\phi = L/[2\pi bR^2 + (2/3)\pi R^3] \ .$$

From the final equation, it can be seen that the assumption used in the calculation of the torque exerted by the bottom of the cylinder, i.e., the coefficient of friction ϕ does not change with velocity, will cause a very small error when R is small as compared with b.

The data given in Table I were obtained with the apparatus for the determination of the coefficient of friction ϕ at the stock-metal interface for unbleached sulphite pulp, unbleached kraft pulp, unbleached soda pulp, and groundwood pulp against the cast-iron surface.

The data given in Table I are plotted in Fig. 4.

The data given in Table II show the effect of consistency on the coefficient of friction ϕ at the stock-metal interface for the four pulps used for the data given in Table I.

The data given in Table II are plotted in Fig. 5.

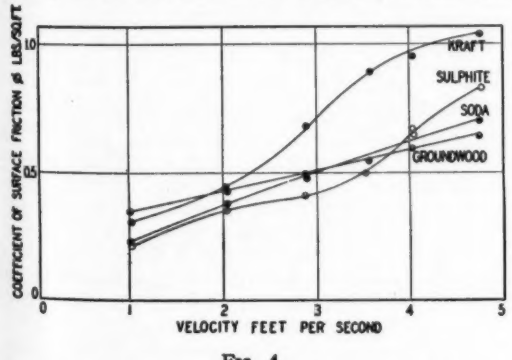


FIG. 4.
Coefficient of surface friction ϕ *vs.* Velocity for various pulps against a cast-iron surface, consistency of pulp 2 per cent.

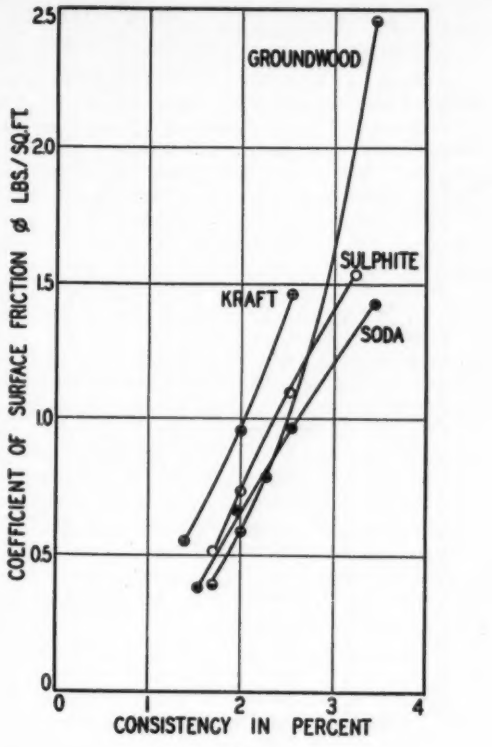


FIG. 5
Coefficient of surface friction ϕ *vs.* Consistency for various types of pulps against a cast-iron surface, velocity 4.06 ft./sec.

Determination of the Coefficient of Friction ϕ' at a Stock-Stock Interface

When the outer cylinder A (Fig. 3) is rotated, the stock will cleave to the ends of the vanes C, forming a rough cylindrical surface whose diameter is equal to that of the set of quadrants formed by the vanes. Therefore, in this system there is a stationary cylinder of stock whose surface is in contact with moving stock. The friction exerted at the interface is trans-

TABLE I.—THE EFFECT OF VELOCITY AND TYPE OF STOCK ON THE COEFFICIENT OF FRICTION ϕ

Consistency of unbeaten pulp 2 per cent

Type of Pulp	Velocity ft. per sec.	ϕ lb. per sq. ft.
Unbleached kraft	1.01	0.31
	2.03	0.45
	2.85	0.69
	3.56	0.93
	4.06	0.96
	4.75	1.06
Unbleached sulphite	1.01	0.22
	2.03	0.36
	2.85	0.42
	3.56	0.50
	4.06	0.67
	4.75	0.84
Unbleached soda	1.01	0.23
	2.03	0.38
	2.85	0.48
	3.56	0.59
	4.06	0.65
	4.75	0.71
Groundwood pulp	1.01	0.35
	2.03	0.44
	2.85	0.50
	3.56	0.51
	4.06	0.63
	4.75	0.67

TABLE II.—THE EFFECT OF CONSISTENCY AND TYPE OF STOCK ON THE COEFFICIENT OF FRICTION ϕ

Velocity of unbeaten pulp 4.06 ft. per sec.

Type of Pulp	Consistency of Pulp (per cent)	ϕ lb. per sq. ft.
Unbleached kraft	1.4	0.55
	2.0	0.96
	2.55	1.46
Unbleached sulphite	1.6	0.50
	2.0	0.67
	2.55	1.09
	3.22	1.54
Unbleached soda	1.56	0.37
	2.0	0.65
	2.57	0.96
	3.43	1.42
Groundwood pulp	1.72	0.39
	2.0	0.63
	2.26	0.80
	3.45	2.43

mitted to the vane system as a torque. The torque L is equal to the coefficient of friction ϕ' multiplied by the surface area of the stationary cylinder of stock. As the torque will be exerted on the vane system, which is attached to a calibrated clock spring, the deflection of the vane system can be converted directly to torque in pound-feet.

With the same considerations used in the development of the equation for the calculation of ϕ at the stock-metal interface, the same equation was developed for the calculation of the coefficient of friction ϕ' at the stock-stock interface.

The data given in Table III are those taken with the apparatus for the determination of the coefficient of friction ϕ' at the stock-stock interface for unbleached sulphite pulp of 3 per cent consistency as it varies with velocity. Data on ϕ for the same consistency are given for comparison.

TABLE III.—THE EFFECT OF VELOCITY ON COEFFICIENT OF STOCK FRICTION ϕ' WITH UNBLEACHED SULPHITE PULP

Consistency of unbeaten pulp 3.0 per cent

Velocity ft. per sec.	ϕ lb. per sq. ft.	Velocity ft. per sec.	ϕ' lb. per sq. ft.
1.01	0.50	1.44	1.09
2.03	0.74	2.87	1.11
2.85	0.92	3.32	1.12
3.56	1.16	4.31	1.12
4.06	1.44	4.79	1.09
4.75	1.50	5.39	1.15
		6.16	1.18
		7.19	1.27

Discussion of Results

The curves in Figs. 4 and 5 are representative of those obtained with the apparatus for the determination of the friction at a stock-metal interface.

At 2 per cent consistency, kraft pulp is shown to have a much higher coefficient of friction throughout the velocity range than the other pulps; the unbleached sulphite falls next in line, with soda and groundwood falling in the order mentioned. At lower velocities, however, they fall in a different order.

When the curves for the variation of the friction with consistency at a constant velocity are studied, it is seen that, at another consistency, the friction values for the various pulps against cast iron would fall in an entirely different order. When the friction for these same pulps against other metal surfaces was plotted against velocity and consistency, the same facts were evident.

Therefore, no generalizations can be made as regards the type of pulp which will give the lowest frictional value when in contact with a metal surface. The specific conditions, namely, the type of pulp, the consistency of the pulp, and the velocity of flow over the metal surface, must be known before any conclusions can be drawn as to what the friction will be.

The slow variation of ϕ' with velocity is in accord with the findings of Sigurd Smith *(1)*.

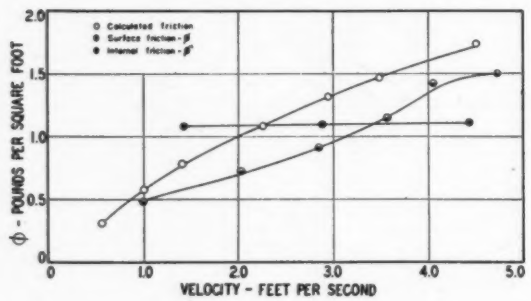


FIG. 6

Coefficient of friction ϕ vs. Velocity for unbleached sulphite pulp of 3 per cent consistency against a cast-iron surface.

Correlation of the Experimental Data with Actual Pipe Flow Data

In Fig. 6, the coefficient of friction ϕ for unbleached sulphite pulp of 3.0 per cent consistency and 820 cc. freeness S.R. is plotted against velocity. On the same axis the coefficient of friction ϕ' (stock against stock) for unbleached sulphite pulp of 3 per cent consistency is plotted. These curves intersect just below the point where the curve for the friction of the stock against the cast-iron surface starts to flatten out. Thus, up to the point of intersection the friction of the stock against the metal surface is less than that of the stock against stock. When this point is passed there should be a cleavage between layers of stock. Such cleavage was actually observed in the apparatus used for the measurement of the friction of stock against metal surfaces.

A simple analysis of the forces existing in the flow of stock in pipes brings out the point that, irrespective of how the friction is produced in pipe flow, it will be transmitted to the surface of the pipe. With this as a basis, the following theory can be drawn for the mechanism of flow of stock in pipes.

At the lower velocities, as the friction of the stock against the metal surfaces is less than the friction of the stock against stock, the pulp should flow as a plug with no apparent velocity gradient over its cross section. With this type of flow, the following equation will hold:

$$pL\pi D^2/4 = \phi''\pi DL,$$

where p is pressure gradient along the pipe, L is a length of pipe considered, D is the inside diameter of the pipe, and ϕ'' is either ϕ or ϕ'. For the purposes of discussion it is convenient to express this equation in the form,

$$p = 4\phi''/D.$$

As the pressure gradient p and velocity of flow increase, the surface friction increases and, at the velocity where the surface friction becomes greater than the internal friction of the stock, cleavage surfaces appear in the stock. These surfaces may not appear over the entire length of pipe at the same time but would possibly start only in a few places along the length. In the regime of velocities below that at which cleavage surfaces are formed, the friction is governed by the surface friction.

However, as soon as the pressure required to move the stock through the pipe becomes sufficient, the cleavage surfaces should become continuous through-

out the length of the pipe, the friction should be governed by the internal coefficient of friction of the stock, and the head loss should assume a value equivalent to this internal coefficient.

At the velocity when the surface friction is equal to the stock-against-stock friction, or where the curves for the two frictional coefficients intersect, the following equation should hold,

$$4\phi/D = 4\phi'/D' ,$$

where ϕ and ϕ' have their previous meanings, and D' is the diameter of the cylinder of stock flowing within the cleavage surfaces.

It can be shown from the equation,

$$p = 4\phi'/D'$$

that, as the pressure gradient increases, the diameter of the cylinder within the cleavage surfaces must become smaller, assuming that the coefficient of friction of stock moving over stock is nearly constant with velocity. This assumption is in accordance with the data on ϕ'. Therefore, it can be assumed that the first cleavage surfaces will appear just a short distance from the surface of the pipe and, as the pressure gradient is increased, new cleavage surfaces will form closer to the center of the pipe.

The types of velocity distribution curves that could be expected are shown in Fig. 7. Curve A would exist when the stock is flowing in the pipe as a plug. Curve B shows the type of flow occurring when the cleavage surfaces are forming but have not become continuous throughout the pipe. Curve C is the velocity distribution curve that will occur when the cleavage surfaces have become continuous and the head loss is governed by the internal friction of the stock. It is in this type of flow that the minimum in the sulphite curve as shown by Forrest and Grierson and in the curves for all pulps as shown by Heller and Brecht would occur.

It is hardly necessary to point out that the existence of a negative slope and maximum in a head loss versus rate of flow curve (*see* Fig. 1) is unusual. Over a good portion of most of the curves, there are *three* possible rates of flow for a given hydraulic gradient; thus, for sulphite stock of 4 per cent consistency flowing in a 6-inch cast-iron pipe, a gradient in head of about 46 ft./100 ft. will sustain a flow rate of either 400 g.p.m. or 1400 g.p.m., or a third possible flow rate greatly in excess of 1400 g.p.m. It is of interest to note that, for a given consistency, the characteristics of the curves for different pipe sizes are better described by velocity of flow than by Reynold's number. For example, the maximum in the Allis-Chalmers curves for sulphite of 4 per cent consistency flowing in cast-iron pipe occurs at 10.2, 10.2, and 10.6 ft./sec., respectively, for the pipe diameters, 6, 8, and 10 inches. This furnishes evidence that the characteristics of surface friction and internal friction, both of which are apparently functions of relative interfacial speed, may be invoked to explain the shapes of the head loss curves. A theory based on the characteristics of the surface and internal coefficients of friction and on the observed behavior of stock as it moves over a solid surface is presented in the following paragraph.

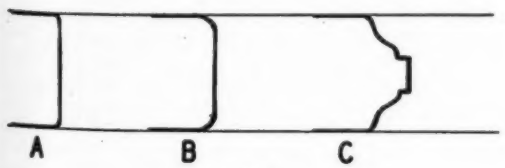


FIG. 7

Predicted velocity distribution curves across pipe line carrying pulps of high consistencies.

It will be recalled that the surface coefficient increases steadily with increasing speed, whereas the internal coefficient is nearly independent of speed. We have seen that for speeds less than v_e, for example, at which the two coefficients are equal, the surface friction governs the head loss and the stock moves through the pipe in plug-like fashion. As the speed of flow and pressure gradient increase, the pressure gradient approaches the value sufficient to cause shearing within the stock. Now at speeds of flow somewhat in excess of v_e, the surface friction is somewhat enhanced, but the internal friction remains substantially unchanged; as the internal friction is now smaller than the surface friction, the head loss will be governed by the internal coefficient, and, as the internal coefficient increases very slowly with increasing speed, it is seen that further increase in head loss with increasing speed should be small. This is in accord with the curves for groundwood stock published by Allis-Chalmers *(5)*, which level out rather sharply at certain rates of flow. The negative slopes of the Allis-Chalmers curves for sulphite and of the Heller and Brecht curves for all the pulps tested by them may be explained by introducing a common observation on the motion of stock near a surface of internal cleavage. As already mentioned, it is anticipated that the first cleavage surface would form within a small distance of the pipe wall. The reason for this is that the force acting on the plug within the cleavage surface, per unit area of the cleavage surface, increases with plug diameter. When cleavage starts, the balls of stock between the cleavage surface and the pipe wall experience an increase in rotational speed. As a consequence, the linear speed of stock immediately adjacent to the pipe wall will be decreased, and the reduced speed will in turn result in reduced surface friction; hence an increment in rate of flow may be accompanied by an observed drop in frictional head. This theory is not given as a complete explanation, for other factors, such as the possible increase in consistency toward the axis of the pipe, proposed in the theory of Forrest and Grierson *(3)*, and electrokinetic phenomena, may play important roles; it is merely given as an explanation which is consistent with the observed data on surface and internal coefficients of friction.

Since the frictional forces existing in pipe flow are transmitted to the surface of the pipe, the effective coefficient of friction as produced by the pipe wall can be calculated from the formula,

$$H = 4L\phi''/wD$$

where H is the head loss in feet of water, ϕ'' is a function of both ϕ and ϕ', L is the length of the pipe in feet, w is the density of water in lb./cu. ft., and D is the pipe diameter in feet.

Using the curve showing the head loss encountered in the flow of 3 per cent unbleached sulphite pulp in a 6-inch cast-iron pipe, published by Allis-Chamlers *(5)*, the values of the coefficient of friction ϕ'' were calculated for a number of velocities in the same range as those used in the experimental work. These values are plotted in Fig. 6.

It should be noticed that the type of curve is very similar to that for the observed values of ϕ. This would lead one to believe that the types of friction

being measured in both cases are of a similar nature.

A study of some of the other variables not included in this article showed that: (1) As the freeness decreases, i.e., as the pulp becomes slower, the surface friction increases. (2) The surface friction increases as the alum content in the pulp is increased. (3) The type of film on the metal surface influences the friction between the metal surface and the stock suspension.

Acknowledgments

The authors thank the Allis-Chalmers Mfg. Company for allowing them to publish curves from their Bulletin 1649 and the Babcock and Wilcox Company for furnishing the stainless steel used in this experimental work.

References Cited

(1) Smith, S. "The Action of the Beater." Translated by R. Marx, especially p. 148-57. London, The Technical Section of the Papermakers' Association of Great Britain and Ireland, 1923.
(2) Manufacture of Pulp and Paper. Vol. 4 (3rd Ed.), Sec. 8, p. 83-5 New York, McGraw Hill Book Co., 1938.
(3) Forrest, F., and Grierson, G. A. H., *Paper Trade J.* 92, no. 22: 39-41 (May 28, 1931).
(4) Brecht, W., and Heller, H., *Wochbl. Papierfabr.* 66: 264-8, 342-4, 380-3, 439-43, 474-6, 529-32, 587-9, 641-4, 714-7, 747-50 (1935); *World's Paper Trade Rev.* 105: 84, 86 ,88. 184, 186, 188 (1936).
(5) Allis-Chalmers Mfg. Co. "Friction of paper stock in cast iron pipes." Bulletin 1649. Milwaukee, 1930.

The Use of Waxes and Case Testing Ink In Testing Printing Papers*

By William A. Kirkpatrick II[1]

Abstract

The merits of the use of Dennison and K and N waxes and of the Case ink and the I. P. I. gloss testing ink, for testing the printing properties of papers.

Methods of testing printing papers have changed completely in the course of the past few years and this change has been brought about primarily through a better understanding of relations between paper and the various printing processes. It has been discovered that in matter of printing quality of coated papers, the sizing or hardness of the coating is of primary importance.

It is common knowledge now that when the ratio of bonding agent to pigment becomes excessive, a definite decrease in the quality of the printing result on the sheet is at once evident. On the other hand, this ratio must not drop too low because a picking or lifting of the coating will result.

On uncoated papers there is practically never any danger of picking except where extremely tacky inks are used in the offset process. In this case, the tackiness of the ink, or the suction of the blanket, may cause a lifting or "fuzzing" of the surface.

Mechanism of Printing

Perhaps the most logical approach to the subject at hand is to consider the mechanism of printing, at least sufficiently to understand the factors involved.

First, a consideration of the printing of coated paper reveals that when the inked type or plate separates from the sheet, a fracture or separation in a multiple bond must take place. The proper place for this fracture is obviously within the ink film preferably near the surface of the plate. There are, however, several other possibilities.

The fracture may take place at the surface of the sheet, the result being a skidding of the ink and a greasy looking impression. To go to an extreme, as in the case of an ordinary ink on a casein washed stock, we find practically no transfer of ink from the plate at all, and a very poor reproduction of the desired impression. If the ratio of adhesive to pigment is too low, the fracture may take place within the coating layer, or at the surface of the fibrous raw stock. This is the most common type to give trouble in printing and is easily recognizable with the aid of a low-power magnifying glass. It is usually called a coating pick.

Then, last of all, the fracture may occur within the fiber structure resulting in a blistering of the surface. If this type of failure takes place in large solid areas as on an offset press, the sheet is apt to "split" or "strip" completely apart.

Older Methods of Testing Coating Sizing

Until comparatively recently, coating was only tested to guard against the possibility of a coating pick. These tests were made by several methods, such as the red sealing wax, the wet thumb, and the dry rub test. In the final analysis, the value of any test on a product is measured only by its correlation with the actual use to which the product is put and from this point of view all these tests fail miserably.

In the red sealing wax test, the fracture never takes place as it does in the printing process because the surface is always pulled up and a sheet judged solely on whether fibers are pulled or not. Obviously, a very strong raw stock would require an oversized coating to pass this test and a lot of paper was formerly condemned that would have printed perfectly well. Likewise, an extremely soft raw stock might make a coating appear sufficiently sized when actually the sheet was not satisfactory for printing. A series of several hundred tests showed this red sealing wax test to correlate about 37 per cent of the time with the actual printing test. The wet thumb test is affected materially by the waterproofness of the coating and also by the softness of the raw stock. The dry rub test takes much experience and even then its correlation with the printing test is usually unreliable.

Development of New Methods

The realization of the deficiencies in these methods brought about the development of the Case or K and N testing waxes, the Case ink and the Dennison paper testing waxes. These were rather slow in being recognized by the industry as a whole, probably because the manufacture of coated paper is only just now emerging from the status of being an art to that of being a modern technical manufacturing process. Be that as it may, these waxes are now quite generally accepted by the paper industry as the basis for

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Roosevelt Hotel, New York, N. Y., Feb. 20-23, 1939.

[1] Member TAPPI, Technical Director, Allied Paper Mills, Kalamazoo, Mich.

coated paper testing. However, they have a number of very definite limitations and in inexperienced hands often lead to erroneous judging of paper quality.

The use of the waxes has now extended beyond the field of paper making, to the print shop and the ink plant. Some paper has been bought on a specified wax test which was at times utterly unreasonable and actually to the disadvantage of the buyer. This situation has fortunately changed, however, and we now find that specifications are made *suggesting* a wax test and if the paper does not meet it and fails to print, then it belongs to the maker. However, they go further and state if the paper does not pass the specification, but does perform satisfactorily, then well and good. In light of what is to follow, it will be seen that this is a much saner proposition.

It will be noted, upon examination, that the Dennison waxes are a resinous brittle type, while the K and N waxes are of the oily or greasy type. This has a definite bearing on their use and value in testing various types of papers.

The K and N Waxes

The K and N series will be considered first, and in view of the fact that the testing must be a surface phenomenon, we find we must confine their use to paper of medium or comparatively low ink receptivity, such as those containing satin white and clay, or just clay. A sheet that is too absorbent to oil, will draw the melted wax into the sheet and this will modify the coating near the surface.

The waxes themselves are made of varying amounts of bayberry and canauba wax as follows: 15, 25, 35, 45, 60, 70, 80, 90 and 100 per cent canauba wax. The method of applying is very important. The tip of the wax is melted over an alcohol, or low gas flame, and the stick quickly and gently placed on the surface to be tested. It should then be left to cool for exactly 15 minutes, at a temperature of 70 deg. F. and a relative humidity of about 50 per cent. When the wax has cooled, it is lifted off and both the tip of the wax and the sheet examined for type of pick. The interpretation of the results of this examination will be discussed later.

The Dennison Paper Testing Waxes

The Dennison series are graded in order of their affinity for a casein film, or casein-clay coating and are numbered from one to the thirties but the first 14 or so are the only ones of much interest in considering most types of printing papers. They are composed of hard resins and "non-oily" waxes and do not wet the surface to which they are applied.

They correlate remarkably well with the printing press when used in sheets containing clay and fine precipitated chalk (calcium carbonate) or just clay. However, when an appreciable quantity of satin white is present, for reasons not thoroughly understood by the writer, the correlation with the printing press is very poor (but considerably better than in the case of the old red wax). The Dennison series is applied exactly the same and under the same conditions of temperature and humidity as the K and N waxes.

Factors Affecting Test

It is a fact that the results of the tests are very materially affected by cooling time, ultimate temperature and humidity. The general effect of these are to make the *sheet* appear as follows:

	K. & N.	Dennison
Shortened time of cooling (less than 15 minutes)	harder	softer
Increased rate of cooling	softer	harder
Ultimate temperature too high	harder	softer
Humidity too high	softer *	softer *

* This is more particularly true where the raw stock is of a generally "soft" type.

The matter of rate of cooling is one which is not generally recognized as being important, but it is. The mechanics of cooling of the melted wax film at the surface of the sheet is not very clearly understood but it is apparent that a crystal structure is set up that is weaker than the main body of the wax. Of course, this crystal structure may be changed in form and strength by changing the rate of cooling. Thus, if a sheet be tested while resting on a metal plate, the results are materially different from those obtained while in contact with a non-conducting wood or fiber board. In general, the most accurate correlation between the wax test and printing results, are obtained when the test is made by placing the paper to be checked on a fiber board base.

The ultimate temperature attained at the contact surface between the wax and paper is of great importance. Considering the Dennison series, lowered temperature seems to make the wax more weak and brittle; hence the sheet appears to be stronger than it actually is. A raised temperature seems to make the resinous waxes more tacky while the K and N series, which are of the "oily" type, lose some of their hardness and strength under these conditions.

Interpreting the Wax Test

The matter of judging the printing quality of a sheet, after the wax test has been properly made, is not entirely a simple matter, and considerable experience and knowledge of both the composition of the paper and the process by which it is to be printed are necessary in arriving at a correct conclusion. A few of the usual types of printing require paper with wax tests somewhat as follows:

(1) The wax test on uncoated paper is used almost solely on offset sheets and these should pass the No. 90 K and N wax and the No. 13 Dennison wax, the latter series, however, does not correlate with press operation as well as the former.

(2) Starch and soya bean coated paper for ordinary letterpress printing should show no coating pick on the No. 5 Dennison wax.

(3) Conventional coated sheets for ordinary letterpress printing should show no pick on No. 4 Dennison wax or the No. 15 K and N wax if satin white is present in the coating. However, if a slight fibre pull is evident, the sheet will usually perform reasonably well provided the ink is not excessively tacky or the form to be printed too heavy. Multi-color jobs should be one wax harder.

(4) The requirements of coated offset papers vary markedly depending on ink and press conditions but a sheet that passes the No. 6 Dennison or the No. 45 K and N wax should prove quite universally satisfactory.

(5) Some opinions to the contrary, the waxes are of comparatively little value in judging a varnish quality coated litho or a gloss ink litho. In both of these cases the casein-pigment ratio is high enough to form a stronger bond in the coating than that usually existing between the fibers. Consequently, as the ratio is increased the bond between the fibers

becomes the dominating factor in the wax test and thus this test is no longer a measure of varnishing or printing quality, which is determined by the characteristics of the coated surface.

Control of Excessive Sizing Important

For most halftone and color work, in addition to producing a sheet that will not pick on the press it is very important that the upper limit of sizing of the coating be not excessively high. If it is too high, a poor reproduction of halftones and a mottling in solid colors results. In addition to this, trouble may be experienced with retarded ink setting which is conducive to offsetting in the delivery pile and with excessively long drying times. A fairly safe rule to observe when considering relation of the wax test to excessive sizing of the coating is that a sheet should show a picking on the wax two steps harder than established as a minimum for strength. Thus, if a sheet is specified to pass the No. 4 Dennison wax, it should show a picking on the No. 6 wax.

Case Ink as a Measure of Ink Receptivity

A third method of measuring coating sizing is the Case ink test developed, as were the K and N waxes, by Dr. Case. This consists of a blue oil-soluble dye ground into a paste with a pigment and a non-oxidizable oil. The testing consists of smearing a considerable excess of this ink onto the sheet being tested, allowing it to set two minutes, then scraping off the excess and wiping the spot clean with a cloth. (This should be done under the same condition of temperature and humidity as are the wax tests, although this is of less importance here). The deeper the ink smear, the more receptive the sheet is to ink. Thus standards may be established and this test used in conjunction with the wax test as a method of eliminating excess hardness of a coating. As a matter of fact, the true usefulness of this test is only evident when the sample being tested is compared directly with a known sample, preferably with exactly the same pigment composition in the coating.

Testing Gloss Ink and Varnish Coated Lithos

As stated above the waxes are of little value in testing the quality of gloss ink or varnish coated lithos. For the former, the best method is actually printing the sheet with I.P.I. gloss testing ink, and for the latter a film of spirit varnish applied by a machine such as the Martinson coater. The gloss ink sheet being checked should always be run as a split test against a known standard of excellence and the degree of gloss compared. The varnish used should be 45 to 50 per cent solids and 4 lb. (plus or minus ½ lb.) per ream of 25x38-500 should be applied. In judging the varnishing quality of the sheet the degree of gloss, discoloration and loss of opacity should all be considered.

After suitable standards for a given grade of gloss ink or varnish litho have been established, the Case ink test may be used with excellent success as a means of mill control, but should not be relied upon as a method of comparing sheets of unlike coating composition.

Finally, let it be reiterated that each of the tests as described above, is subject to definite limitations and careful consideration of all factors involved is absolutely necessary in their use and interpretation. They are excellent tools, when used properly.

NOTE:—Case ink and the K and N testing waxes may be obtained from the K and N Laboratories, Wrigley Building, Chicago, Ill. The waxes are often referred to according to color, as follows: No. 15—yellow; No. 25—red; No. 35—blue or green; No. 45—purple.

The Dennison paper testing waxes are obtainable from the Dennison Manufacturing Company of Framingham, Mass.

I.P.I. gloss testing ink may be procured through any International Printing Ink Company branch offices.

Martinson Lab Coater is made by the Martinson Machine Co. of Kalamazoo, Mich.

Dry Coating of Paper *

By J. C. Pullman[1]

Abstract

Presenting a new process developed for adding a high luster and increased utility to paper by the molten application of plastic material to the base stock at high speed without solvents or other vehicle carriers and thus eliminating fire hazards. As penetration is slight the process is applicable to almost any base stock and renders it resistant to water, moisture-vapor, grease, etc., while at the same time providing high luster and brilliant color effects.

Introduction

Prior to the advent of dry coated papers, probably the nearest approach to the results now obtained was through the use of lacquers.

The shortcomings of the process of lacquering papers were studied and analyzed some years ago by B. C. Miller and he conceived the idea of simply melting the solids content of lacquer and applying it to paper in its molten state as a method of eliminating the use of the solvent vehicle. But, as the lacquer base, which is generally nitro-cellulose, was not susceptible to melting he began a research for other compositions which would have the finished characteristics of lacquer, yet could be heated and applied while hot.

While the solvent vehicle of a lacquer provides a natural flow-out, and consequently smoothness, to the coating a molten material sets too quickly for this to occur and thus means had to be invented to effect an even coating surface in the new prices.

The process is already protected by several issued patents[2] while several other patent applications are now pending.

[2] U. S. Patents 2,070,553; 2,117,199; 2,117,200.

Dry Coating Composition

Following the development of utilizing the solid or non-volatile content of lacquer, it was very quickly determined that there were no resins available which would fill the purpose of nitrocellulose.

The effort to obtain the cellulose characteristic in the resin has been the chief and foremost factor of the entire research. A logical base from which to obtain the coating material was found in the synthetic resin groups such as alkyd, hydrocarbon,

* Presented at the Annual Meeting of the Technical Association of The Pulp and Paper Industry, Roosevelt Hotel, New York, N. Y., Feb. 20-23, 1939.

[1] Member TAPPI, Research Chemist, Bert C. Miller, Inc., New York, N. Y.

phenolic, etc. The resins gave to the coating the gloss, finish, a certain amount of resistant characteristics and formed the melt into which the other necessary materials might be added.

The resin had to be hard and non-tacky at normal temperatures but capable of being melted to its fluid state; to be stable against heat at the application temperature; to be non-polymerizing and non-oxidizing; to be colorless, odorless, tasteless, non-toxic as possible and fast to light.

To obtain a flexible coating on the paper the resins were modified by the use of plasticizers such as cellulose ethers, vinyl polymers and polymerized hydrocarbons of the synthetic rubber type. To further increase the pliability phthalate or similar esters were used.

Finally various waxes, metallic soaps and oils are incorporated into the coating formula for the purpose of increasing its resistance to water, oil, grease, moisture-vapor, etc., when and as desired.

The coatings which have been discussed so far are clear and transparent. They may be applied over a colored base stock or over multi-colored printing. In each case the coating sharply enhances the normal tones of the applied colors. It produces a higher brilliance which adds distinctiveness, attractiveness and eye-appeal to the completed paper.

However, when opaque coatings are desired, as in the use of a cheap base paper, pigments like titanium dioxide can be successfully introduced to render a non-transparent coating.

Application of Dry Coating

The specially designed machines for applying Dry Coating are most simple in operation and compact in size. They will apply coatings on either one or both sides in a single operation.

In general, there are four methods of application which may be classified as the roll, the knife, the casting and the extrusion methods. The first, or roll, method is the best developed to date and the most practicable. It is the only one which will be elaborated upon in this discussion.

Roll coating, itself, divides into three types of operations: the squeeze, the contact and the rotogravure methods.

In the squeeze method there are two heated metal nip rolls with adjustments for regulating the distance between them. The paper passes through the nip while the molten material is fed to the lower roll either from a dip tank or trough.

In the contact method there are two or more rolls and the molten material, which was picked up by the lower roll, is metered to the top roll and is applied thence to the paper which passes over it.

In the rotogravure method the coating is applied by intaglio, the same method employed in the printing of gravures or etchings, except that in dry coating the engraving plate itself is heated to keep the molten coating hot while it is being applied. Thus, dry coating by rotogravure is applied in dots.

All three types of application must be followed by a smoothing operation because the surface is otherwise rough and somewhat discontinuous. Thus, in all three methods of application the newly coated paper is immediately passed over a heated bar which renders a smooth continuous surface without removing any of the coating from the paper. The coating can be set rapidly by passing over chilled rolls before winding or sheeting.

Properties and Uses of Dry Coating

The outstanding quality of dry coating is the brilliance and gloss which it imparts to any base paper stock. It is designed to expand the use of so-termed luxury papers (those having exceptional eye-appeal) into consumer fields in which they have heretofore been considered prohibitive, because of the materially reduced production costs of Dry Coating.

When this new coating is applied over printing there is no bleeding of the inks. The normal luster of the ink colors is vividly brightened by the addition of the coating and a slight illusion of depth, or a third dimension, is imparted.

This illuminating quality of dry coating makes it admirably suited for use on magazine covers, book jackets, display cards, food packages, cartons, bags, labels, etc.

Another feature of dry coating is the effect produced by the addition of pigments in the applied coating. For example titanium dioxide will render the coating opaque and white. Such a coating on a low grade base stock will give a high glossy white covering which greatly enhances the value of the original paper.

This type of coating, also, will accept ordinary printing inks and will visibly "step up" the native color qualities of the inks, rendering the completed composition one of high shimmer and brilliance. Dry coating is adaptable to all types of printing operations including letter press, gravure and offset. As dry coating is resistant to water it can be used to protect as well as enhance printing obtained with water colors. The coating material is thermoplastic and may be sealed by the application of heat.

Dry coating can be made resistant to grease and oils which makes it suitable for carton liners or the inner side of boxboard for food containers, such as a doughnut box. It can be produced also resistant to moisture, which quality is a requisite today in the packaging of many foods.

When dry coating is applied to two sides of glassine a degree of transparency, moisture resistance and gloss is obtained. These qualities have been proved desirable as modern wraps for foods, tobaccos and other merchandise.

Advantages of Dry Coating

The chief advantage of dry coating over lacquered or other solvent-applied coatings is its ease of application to almost any base paper and at an appreciably lowered cost of production.

This advantage arises mainly because of the absence of a solvent vehicle in the production of dry coating and the elimination of space-consuming drying tunnels. Not only do these reduce the rate of coating speed but the lacquering operation also adds substantial fire hazards not present in the new process.

In the present method of dry coating the molten material chills so quickly that penetration is limited to the slight degree required to bind or anchor the coating to the base paper stock. This enables it to be applied to a vast range of paper stocks varying in texture and porosity while solvent-applied coatings tend toward greater penetration and requires specially treated base stocks for good results.

Some of the Factors Influencing the Selection of Mill Sites in the South*

By D. G. Moon[1]

Abstract

The factors affecting the selection of any mill site are primarily wood supply, water supply, power resources, shipping facilities and labor. This paper covers a short discussion of the variables prevalent in each and a theoretical comparison is shown as a typical example for considering the influencing factors that might develop between a tide water and an inland location.

Consumption and Production Influences

In contemplating the future of further development of the pulp industry in the south it might be well to first review briefly the growth of the industry. In the year 1900 the total consumption of paper products in the United States was not more than 7,000 daily tons, whereas today it has reached close to 50,000 daily tons, including all grades, and of this 41,000 tons is made in this country and the balance imported. Therefore the normal growth which shows no inclination to be even approaching the saturation point is well over 1,000 daily tons per year.

The development of the use of southern woods for pulp may be traced back as far as 1909 where an initial cook as sodium sulphide was made on February 26th at Roanoke Rapids, N. C., and considering the southern states to consist of Alabama, Arkansas, Georgia, Florida, Mississippi, North Carolina, South Carolina, Tennessee, Louisiana and Texas, by 1935 there were thirty-one mills having a total productive capacity of 4,000 daily tons, and then during the last three years a sudden influx of thirteen additional mills now brings this capacity up to 7,600 daily tons.

At the present time the principal products of these southern mills is in the form of kraft, bag, liner, wrapping and box boards. Several mills however are now producing bleached sulphate pulp for the use of white papers and the research work now being done indicates that the manufacture of pulp for white papers from southern woods has considerable possibility in opening up a field for further production of book, writing and specialty grades, as well as rayon in which gum and other hardwoods may also take a part.

While the sudden addition of productive capacity in the south during the last year or so undoubtedly created some concern and readjustment within the industry, particularly in the early months of 1938, the close of that year finds most of these mills operating at normal capacity.

When considering therefore such factors as the normal increase in paper consumption in the United States, the tendency to offset imports, as well as replacement necessary in some of the older mills, coupled with a practical assurance of a permanent wood supply, it is reasonable to expect that further development in the south will continue along slower but more carefully studied lines, and that the means to produce products of a more diversified character will also be found.

These southern states bounded as they are by the Atlantic Ocean and the Gulf at a first glance would indicate that the location of a mill on tide water would have inherent advantages, that is disregarding the sections which more logically feed the mid-western territories. However, it is believed that such a tide water location is by no means essential or even strictly economical in every case and while a great number of factors enter into any selection and a great many comparisons might be made, one purely theoretical example will be given in this discussion in considering the location for let us say a 200 ton bleached pulp and paper mill, with the pros and cons discussed in elementary form comparing a tide water to an inland location.

The principal factors affecting the consideration of a mill site are mainly wood supply, water supply, power resources, shipping facilities and labor.

Wood Supply

In the ten southern states considered it has been conservatively estimated by foresters that there are 130 million acres of forest land of which 90 million is pine, also that there are 250 million standing cords suitable for pulp wood and 365 million cords suitable for saw logs. The present pulp mills at full capacity would require close to four million cords per year.

We are also told that the normal increment without forest protection or management is at least one-third of a cord per acre per year, and that with management and fire protection this increment can be brought up to one and one-half cords per acre per year. The normal increment therefore is sufficient to sustain 80,000 daily tons of pulp and five times that amount under proper forest management and conservation. Not every forest land owner can be expected to adopt a long range timber growing program, and the lumberman's axe is undoubtedly first attracted to the standing timber which roughly is sufficient to supply 25,000 daily tons of pulp for twenty years. Assuming that the 200 ton mill referred to above could be located in the center of a good forest stand of which at least two-thirds of the land was suitable for forest growth and that two-thirds of this forest growth was suitable to produce pine and that the annual increment was one-third of a cord per year, also that one and two-thirds cords were required to produce a ton of pulp this figures out that such a mill could draw all of its wood supply from a radius of nineteen miles with an average haul of thirteen miles, that is without forest management or conservation.

This same mill with intensive conservation bringing the increment up to one and one-half cords per acre could therefore draw its supply from within an eight mile radius and an average haul of five miles.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Roosevelt Hotel, New York, N. Y., Feb. 20-23, 1939.

[1] Member TAPPI, Consulting Engineer, Savannah, Ga.

Both the managed and unmanaged forest area above would be within a reasonable limit for direct truck haul to the mill, the average haulage cost probably being around $2.00 for the thirteen mile haul as against $1.35 for the five mile haul, a saving of 65 cents a unit of 160 cubic feet or $1.00 a ton. However, against this would have to be figured the cost of forest management.

It is generally found that mill locations on tide water are somewhat further away from the more prolific forest areas due to the greater extent of low lands and water ways as well as farm lands and might easily add a twenty mile additional haul and with a semi-circle instead of a circle to draw from with the distance extended to a point where it is necessary to use rail or water shipment which still requires an initial movement by truck of an average of five miles as well as banking and storing at the siding or dock.

Location on tide water has the natural advantage of water transportation for wood which permits drawing from a territory that is roughly twice as far removed as it is by rail for about the same cost.

Availability of Suitable Woods

Another factor that requires consideration is availability to select the most economical woods in relation to type, age and density, as well as pre-use for naval stores, particularly as such wood is bought by the cord or unit and not by the weight.

In the section bordering the Atlantic and Gulf coast the forests are largely long leaf or slash pine intermixed with loblolly and other pines as well as hard woods and cypress in the lowlands. These have been generally used as a source of a very large percentage of the World's naval stores, that is turpentine, rosin and pitch. Long leaf is also found in the forests of north central Alabama. In the interior to the north of the coastal belt the forests are more generally loblolly and short leaf pine, of course intermixed with hard woods.

Water Supply

The character and quality of the waters of the southern states are somewhat diversified, those from the mountain streams are very soft and quite free from harmful amounts of dissolved mineral matter. In the lower plains away from the coast the streams are usually silt laden and sometimes carry large amounts of suspended matter, however, they also are quite free from mineral matter.

The streams in the coastal plain are often swamp water and quite highly colored but low in suspended matter, sometimes contain iron, and are usually more difficult to coagulate then the turbid river waters.

The Atlantic coastal plain to a large extent obtains its water from artesian sources the geology of which has really not been determined fully and excessive use in several locations may tend to decrease the static head.

The water requirements for our theoretical 200 ton mill would probably run to five million gallons per day for process work and seven million gallons per day for the bleach plant, equivalent to an average of 8500 g.p.m.

Where artesian water is available this is naturally given first thought, however to prevent excessive draw downs it is necessary to locate the wells a considerable distance apart usually one-half mile with the capacity of each averaging 3000 gallons a minute. Our theoretical mill therefore would require three such wells and the furthest would have to be piped at least a distance of a mile to the mill which might bring the installation cost for the wells, pipe lines, power, etc., close to $100,000.00, and taking the carrying charges at 12 per cent and the power requirements at six mills would average out to approximately 50 cents per ton for the main water supply.

The waters from these artesian wells are usually hard ranging from five to twenty grains and over per U. S. gallon and for bleaching operations should be softened, and equipment for this purpose to take care of seven million gallons a day might easily run another $100,000.00 and considering the carrying charges, chemicals and labor for such a softening plant could add approximately 70 cents per ton of pulp. Many of these artesian waters contain troublesome amounts of hydrogen sulphide which requires a very thorough aeration for removal of this corrosive material, iron also may be prevalent but manganese rarely is noticed.

Generally the water in the rivers and streams far enough removed from the ocean to be free from brine while silt laden are fairly soft averaging one grain of hardness per U. S. gallon and coagulate and settle out readily with the use of approximately two grains of alum per gallon and one grain of soda ash and a suitable supply for our theoretical mill could probably be developed for around $50,000.00, which with the chemical and other factors would bring the cost of water supply to around 20 cents a ton.

Further back in the more mountainous regions in a great number of cases extremely soft and clear water is available which would normally require but very little treatment.

Underground water supplies are apparently available also in some of the valleys of the larger streams and the lime stone formation in Georgia, Alabama and Florida contain many springs and while much information is accumulating a great deal more is needed and a careful study of these resources is of prime importance in selecting any mill site.

Power Resources

The majority of the mills developed or proposed have considered in the main the production of pulp by the sulphate process which presents the opportunity to generate the major portion of the steam and power requirements from waste liquor and wood refuse. These self-sustaining amounts being dependent somewhat upon the boiler pressures it is deemed advisable to install.

Taking the case of our 200 ton theoretical mill under the sulphate process it would require approximately 1000 kw.-hr. per ton of finished product and 23,000 pounds of steam per ton of which 19,000 pounds would be required for process after being converted into power and 3,500 would be required for direct generation of approximately 300 kw.-hr. per ton that could not be obtained from the steam used for process work. This is on the basis of a boiler installation for around 450-lb. pressure and 750 degrees superheat. However, if higher pressures were deemed advisable the additional power generation could of course be reduced. This is a problem of its own. Our theoretical mill would therefore require a power generating unit of the extraction and condensing type for an 8500 kw. average

load of which 2500 kw. would have to be generated by the condensing stage of the turbine or purchased.

Another factor which sometimes requires a careful study in designing the mill power plant particularly for those of smaller tonnage is in regard to the relative advantage of a high pressure system requiring extremely skilled operation as against the simple low pressure steam and power generation with some purchased power which the average fireman and electrician can handle. From a practical standpoint it sometimes develops that the latter can obtain the same relative cost with a much smaller initial investment if power can be purchased cheaply. Power and steam requirements can sometimes be combined with closely adjoining public utility or other industrial power plants to mutual advantage.

Fuels Available

Fuels available in the south are generally coal, gas, fuel oil, and waste saw mill refuse. High grade bituminous coal is found in Alabama, Tennessee, Kentucky and West Virginia, the quality however from the several areas varies appreciably and equipment must be designed in respect to the use of the most definite supply in relation to cost.

In the western section of the south notably Louisiana, Texas, Arkansas and Mississippi natural gas and oil are available which in some instances are carried by pipe lines for considerable distances. In one or two extremely favorable instances it has been estimated that power could be generated from gas as low as for three mills using other fuels.

Oil is available through water delivery from Mexico, Texas and Louisiana to the coastal sections of the south at a competitive rate usually lower than coal so that it is practical to develop large blocks of firm steam power for around six mills at the station board.

Closer to the interior hydro-electric developments have been making considerable progress and in some localities the power resources from the TVA are also available. A project now under development in the Sante-Cooper River near Charleston it is understood will develop 450,000,000 kw.-hr. prime and 250,000,000 kw.-hr. secondary per year for which the rates will be approximately 5.5 mills per kw-hr. for prime and 2.0 mills per kw.-hr. for secondary.

It is obvious that the economical manufacture of ground wood pulp in the south will depend materially upon the availability of low price power even though some research work has indicated that ground wood power requirements may be reduced considerably.

Shipping Facilities

Locations close to the seaboard offer a natural advantage of water transportation through its ports. However the economics involved in considering as to whether a mill should locate on deep water, construct its own dock and storage sheds, as against using the facilities of a port terminal already developed require careful study.

A mill having its own dock must necessarily have sufficient storage capacity to hold accumulations between trips of the servicing vessels and in the case of our 200 ton theoretical mill the investment for such might easily run $250,000.00, which considering the carrying charges, maintenance, etc., might represent 50 cents a ton on the finished product.

Where shipments are made from the mill to an already existing port terminal advantage can usually be taken of more periodic shipments in smaller quantities resulting in a great reduction in storage facilities necessary and better service to customers.

Water shipments are of course also inducive to low delivery rates for incoming supplies such as salt cake, lime, wood and other materials and when considering a location away from such the incoming freight must also be taken into consideration.

A number of the major streams in the south also offer some advantage for barge shipment to the interior and of course the inland water way bordering the coastal region presents an opportunity not to be overlooked.

Labor

After all it is believed little differences in actual cost of labor will be experienced in different locations. The majority of the working forces in a pulp mill come under the skilled and semi-skilled classification and the question of turnover will depend to a large degree upon the living conditions prevalent in the vicinity.

Where mills are located close to other industrial centers and towns recreational and housing facilities are more readily available. However, where the mill is somewhat removed, some form of an industrial housing and recreational development is usually necessary and under the various plans now offered through government facilities these can usually be arranged without becoming a burden to the operating company although some initial outlay may be necessary.

Locations close in to cities should also take into consideration the necessity of more careful regulation of mill odors and stack gases and should be selected after careful studies of prevailing winds, effect of stack heights, etc.

Typical Comparisons

Although, as mentioned above, a multitude of comparisons might be made we will make just one comparing a theoretical mill located at an imaginary point on deep water as against a similar mill located approximately 75 miles inland, the generalities of which have been referred to in the preceding.

A Tabular Summary

The following tabulations summarize the affecting influences which show that there is perhaps in this purely hypothetical case a little in favor of an inland site in addition to which the initial development cost might be reduced by $400,000.00. This balance would be reversed however where cheaper water facilities were available.

TYPICAL COMPARISON OF COSTS AFFECTING INLAND AND TIDE WATER SITE FOR 200 DAILY TON BLEACHED PULP AND PAPER MILL

	TIDE WATER	INLAND
Distance from port facilities	Own dock	75 miles
Average truck haul wood	6 miles to railway	13 miles to mill
Average rail haul wood	50 miles	....
Cost per wood unit (160 Cu.Ft.) truck haul	$1.35	$2.00
Cost per wood unit (160 Cu.Ft.) banking..	.35	....
Cost per wood unit (160 Cu.Ft.) rail haul.	1.30	....
Total cost per unit hauled	$3.00	$2.00
Cost @ 1.5 units per ton of pulp	$4.50	$3.00
Freight on finished product to port terminal	....	1.60
Carrying charges and maintenance on own dock and storage	.50	....
Storage charges at port	....	.22
Additional freight on fuel oil at 2.5 barrels per ton of paper	....	.09
Additional freight on salt cake, 200 pounds per ton of Pulp @ 17c per cwt.	....	.34
Cost of water supply from rivers	....	.20
Cost of artesian well supply	.50	....
Cost of softening water for bleach	.70	.15 to .30
Affected cost per ton of paper	$6.20	$5.60

Imports of Paper and Paper Stock

Giving Manifests of New York, Boston, Philadelphia and Other Ports of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Wallboard, Cigarette Papers, Sulphite, Kraft and Ground Wood Pulp.

NEW YORK IMPORTS

WEEK ENDING SEPTEMBER 16, 1939

SUMMARY

Cigarette paper .....107 cs.
Wall paper .....1 cs.
Paper hangings .....4 bls., 1 cs.
Newsprint .....15,295 rolls
Printing paper.....11 cs.
Wrapping paper.....464 rolls, 181 bdls., 70 bls., 5 cs.
Filter paper .....23 cs.
Drawing paper .....4 cs.
Tracing cloth.....13 cs.
Surface coated paper.....64 cs.
Basic paper .....7 cs.
Photo paper .....2 cs.
Decalcomania paper .....24 cs.
Tissue paper .....51 bbls., 47 cs.
Letter paper .....4 cs.
Fancy paper .....1 ble., 2 cs.
Glazed paper .....10 cs.
Miscellaneous paper .....6506 rolls, 778 bls., 79 cs.

CIGARETTE PAPER

Champagne Paper Corp., *Ile de France,* Havre, 10 cs.
Braunstein Freres, Inc., *Ile de France,* Havre, 97 cs.

WALL PAPER

F. J. Emmerich, *Vandyck,* Liverpool, 1 cs.

PAPER HANGINGS

W. H. S. Lloyd & Co., *American Trader,* London, 4 bls.
W. H. S. Lloyd & Co., *Noordam,* Rotterdam, 1 cs.

NEWSPRINT

International Paper Co., *G.D.D.,* Gatineau, 303 rolls.
Gilman Paper Co., *Helvig,* Rotterdam, 70 rolls.
Lunham & Reeve, Inc., *Tunaholm,* Kotka, 134 rolls.
Pulp Sales Corp., *Tunaholm,* Kotka, 210 rolls.
Nolan Bowmall & Co., Inc., *Tunaholm,* Gothenburg, 119 rolls.
Parsons & Whittemore, Inc., *Tunaholm,* Gothenburg, 188 rolls.
H. G. Craig Co., Inc., *Kermic,* Donnacona, 383 rolls.
International Paper Co., *A.C.D.,* Gatineau, 365 rolls.
Nolyan Bowmall & Co., Inc., *Kungsholm,* Gothenburg, 72 rolls.
Perkins Goodwin & Co., *Kungsholm,* Gothenburg, 189 rolls.
International Paper Co., *International #1,* Gatineau, 280 rolls.
News Syndicate Co., Inc., *Brand,* Comeau Bay, 7,219 rolls.
International Paper Co., *G.T.D.,* Gatineau, 366 rolls.
——, *Oslofjord,* Oslo, 209 rolls.
Pagel Horton & Co., Inc., *Oslofjord,* Skien, 746 rolls.
International Paper Sales Co., *P. T. Dodge,* Dalhousie, 4,130 rolls.
H. G. Craig Co., Inc., *Newscarrier,* Donnacona, 312 rolls.

PRINTING PAPER

Oxford University Press, *Vandyck,* Liverpool, 11 cs.

WRAPPING PAPER

——, *Kungsholm,* Gothenburg, 39 rolls.
Products from Sweden, Inc., *Kungsholm,* Gothenburg, 70 bls., 181 bdls., 425 rolls.
——, *American Trader,* London, 5 cs., (waxed).

FILTER PAPER

E. H. Sargent & Co., *Kungsholm,* Gothenburg, 5 cs.
H. Reeve Angel & Co., Inc., *American Trader,* London, 18 cs.

DRAWING PAPER

H. Reeve Angel & Co., Inc., *American Trader,* London, 2 cs.
Keuffel & Esser Co., *American Trader,* London, 2 cs.

TRACING CLOTH

E. Dietzgen & Co., *Vandyck,* Liverpool, 13 cs.

SURFACE COATED PAPER

Gevaert Co., of America, *Black Heron,* Antwerp, 64 cs.

BASIC PAPER

Dingelstedt & Co., *Westernland,* Antwerp, 7 cs.

PHOTO PAPER

Medo Photo-Supply Co., *American Trader,* London, 2 cs.

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., *Vandyck,* Liverpool, 5 cs., (duplex), 19 cs., (simplex).

TISSUE PAPER

Jay Madden Corp., *Tunaholm,* Kotka, 51 bbls.
Davies Turner & Co., *American Trader,* London, 1 cs.
G. F. Malcolm Co., Inc., *Vandyck,* Liverpool, 46 cs.

LETTER PAPER

Marshall Field & Co., *Ile de France,* Havre, 4 cs.

FANCY PAPER

C. A. Haynes & Co., *American Trader,* London, 2 cs., 1 ble.

GLAZED PAPER

American Express Co., *Mercier,* Antwerp, 10 cs.

MISCELLANEOUS PAPER

Titan Shipping Co., *Ile de France,* Havre, 12 cs.
Manufacturers Trust Co., *Ile de France,* Havre, 5 cs.
National Pulp & Paper Co., *Tunaholm,* Gothenburg, 5,973 rolls, 65 bls.
Japan Paper Co., *Grete Maersk,* Kobe, 62 cs.
F. L. Kramer & Co., *Kungsholm,* Gothenburg, 261 bls., 78 rolls.
The Borregaard Co., Inc., *Kungsholm,* Gothenburg, 455 rolls, 39 bls.
——, *Kungsholm,* Gothenburg, 413 bls.

RAGS, BAGGINGS, ETC.

R. & V. Miller, Inc., *Helvig,* Antwerp, 3 bls. rags.
National City Bank, *Helvig,* Antwerp, 22 bls. rags.
T. D. Downing & Co., *Helvig,* Antwerp, 2 bls. rags.
——, *Helvig,* London, 94 bls. rags.
Manufacturers Trust Co., *Binnendyk,* Rotterdam, 49 bls. rags.
——, *Binnendyk,* Rotterdam, 39 bls. rags.
Chase National Bank, *Black Falcon,* Rotterdam, 55 bls. bagging.
Chase National Bank, *Vandyck,* Liverpool, 29 bls. thread waste, 71 bls. rags, 39 bls. bagging.
——, *Vandyck,* Liverpool, 250 bls. rags, 14 bls. thread waste.
American Express Co., *Vandyck,* Liverpool, 40 bls. rags.
——, *Black Heron,* Antwerp, 14 bls. rags.
D. S. Stern Corp., *Pr. Monroe,* Bombay, 100 bls. cotton waste.
——, *Pr. Monroe,* Bombay, 100 bls. cotton waste.
Manufacturers Trust Co., *Pr. Monroe,* Bombay, 218 bls. cotton waste.
Irving Trust Co., *Pr. Monroe,* Bombay, 100 bls. cotton waste.
Commercial Bank of Greece, *Exiria,* Piraeus, 250 bls. rags.

OLD ROPE

——, *Helvig,* London, 98 coils.
Chase National Bank, *American Trader,* London, 72 coils.
——, *American Trader,* London, 196 coils.
E. J. Keller Co., Inc., *Noordam,* ——, 94 coils.
——, *Gitano,* Hull, 6 coils.
——, *Gitano,* Newcastle, 53 bls.

CHINA CLAY

J. W. Higman Co., Inc., *Noordam,* Rotterdam, 240 bags.

CASEIN

American British Chemical Supplies, *Scanmail,* Buenos Aires, 910 bags.
———, *Black Falcon,* Rotterdam, 250 bags.

WOOD PULP

Gottesman & Co., Inc., *Exiria,* Constanza, 1,000 bls. bleached sulphite, 200 tons.
Castle & Overton, Inc., *Tunaholm,* Viipuri, 135 bls. dry bleached wood pulp, 262 bls. dry unbleached wood pulp.
Pulp Sales Corp., *Tunaholm,* Spjutsund, 1,170 bls. dry mechanically ground pulp.
J. Anderson & Co., *Tunaholm,* Gothenburg, 350 bls. dry bleached sulphite.
D. M. Hicks, Inc., *Kungsholm,* Gothenburg, 600 bls. dry sulphite.
J. Anderson & Co., *Kungsholm,* Gothenburg, 875 bls. dry bleached sulphite.
D. M. Hicks, Inc., *Mercier,* Antwerp, 247 bls. wood pulp.
E. M. Sergeant Pulp & Chemical Co., *Oslofjord,* Nygard, 250 bls. dry chemical pulp.
Chase National Bank, *Oslofjord,* Oslo, 900 bls. dry bleached sulphite.
The Borregaard Co., Inc., *Oslofjord,* Sarpsborg, 504 bls. dry unbleached sulphate.
———, *Oslofjord,* Sarpsborg, 150 dry bleached sulphite.
Perkins Goodwin & Co., *Oslofjord,* Drammen, 125 bls. bleached sulphite.
Price & Pierce, Ltd., *Stavangerfjord,* ———, 375 bls. bleached sulphite.

WOOD PULP BOARDS

———, *Tunaholm,* Viipuri, 226 rolls.
Jay Madden Corp., *Tunaholm,* Viipuri, 249 bls.
———, *Tunaholm,* Kotka, 66 rolls.
Jay Madden Corp., *Tunaholm,* Kotka, 48 bls., 125 rolls.
Fibre Case & Novelty Co., *Tunaholm,* Gothenburg, 21 bls.
Beaverite Products, Inc., *Tunaholm,* Gothenburg, 57 bls.
Standard Fibre Specialties Corp., *Kungsholm,* Gothenburg, 23 bls.

ALBANY IMPORTS

WEEK ENDING SEPTEMBER 16, 1939

Halifax Power & Pulp Co., *Hans Maersk,* Sheet Harbor, N.S., 9,771 bls. wood pulp.

BOSTON IMPORTS

WEEK ENDING SEPTEMBER 16, 1939

———, *Black Falcon,* Antwerp, 33 bls. rags.
International Paper Sales Co., *P. T. Dodge,* Dalhousie, 2,829 rolls newsprint.
Price & Pierce, Ltd., *Hammaren,* ———, 150 bls. bleached sulphite.

PHILADELPHIA IMPORTS

WEEK ENDING SEPTEMBER 16, 1939

Castle & Overton, Inc., *Tunaholm,* Viipuri, 393 bls. dry unbleached pulp, 391 bls. dry bleached pulp.
J. W. Hampton, Jr., *Tunaholm,* Kotka, 254 rolls newsprint.
Jay Madden Corp., *Tunaholm,* Kotka, 148 rolls wood pulp boards.
Pulp Sales Corp., *Tunaholm,* Kotka, 210 bls. bleached sulphite.
Perkins Goodwin & Co., *Tunaholm,* Gothenburg, 140 bls. sulphate.
F. Whitaker Co. *Tunaholm,* Gothenburg, 5 bls. rags.
National Pulp & Paper Co., *Tunaholm,* Gothenburg, 602 rolls, 14 bls. paper.
Bulkley Dunton Pulp Co., Inc., *Tunaholm,* ———, 381 bls. sulphate.
Price & Pierce, Ltd., *Tortugas,* ———, 625 bls. bleached sulphite.

BALTIMORE IMPORTS

WEEK ENDING SEPTEMBER 16, 1939

Gottesman & Co., Inc., *Tunaholm,* Gothenburg, 1,129 bls. sulphate.
Pulp Sales Corp., *Tunaholm,* Viipuri, 255 bls. wood pulp.
Castle & Overton, Inc., *Tunaholm,* Viipuri, 2,808 bls. dry unbleached pulp.
Pulp Sales Corp., *Tunaholm,* Spjutsund, 1,040 bls. dry mechanical pulp.
H. Reeve Angel & Co., Inc., *Tunaholm,* Kotka, 1,062 rolls newsprint.
F. H. Shallus Co., *Tunaholm,* Kotka, 195 bls. newsprint.
Jay Madden Corp., *Tunaholm,* Kotka, 1,635 rolls newsprint.
Pulp Sales Corp., *Tunaholm,* Kotka, 756 bls. bleached sulphite.
The Borregaard Co., Inc., *Tunaholm,* Gothenburg, 350 bls. bleached pulp.
Parsons & Whittemore, Inc., *Tunaholm,* Gothenburg, 350 rolls newsprint.
Nolan Bowmall & Co., Inc., *Tunaholm,* Gothenburg, 144 rolls newsprint.
Perkins Goodwin & Co., *Tunaholm,* Gothenburg, 325 bls. sulphate.
S. Shapiro & Son, *Black Heron,* Antwerp, 44 bls. rags.
American Express Co., *Black Heron,* Antwerp, 9 cs. wrapping paper.
Gottesman & Co., Inc., *Exiria,* Constanza, 1,000 bls. bleached sulphite, 200 tons.
Price & Pierce, Ltd., *Tortugas,* Constanza, 175 bls. bleached sulphite.

TO A GULF PORT

WEEK ENDING SEPTEMBER 16, 1939

Price & Pierce, Ltd., *Uddeholm,* ———, 6,000 bls. unbleached sulphate.

MONTREAL IMPORTS

WEEK ENDING SEPTEMBER 16, 1939

Pagel Horton & Co., Inc., Trolla, Sweden, 9,000 bls. wood pulp.

Chas. W. Boyce Resigns

At a special executive meeting of the American Paper and Pulp Association, held at 122 East 42nd street on September 13, called to discuss current conditions in the industry, Charles W. Boyce, executive secretary tendered his resignation.

Mr. Boyce has been connected with the association since 1928 and has served as executive secretary since 1932. He will terminate his duties at the annual convention of the American Paper and Pulp Association to be held at the Waldorf Astoria Hotel, New York, February 19-22, 1940.

Mr. Boyce leaves the association to become associated with the Northwest Paper Company, Cloquet, Minn., as vice-president. His successor has not yet been determined and will be announced at the convention next year.

B. C. Revokes Logging Operations

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., September 11, 1939—Regulations suspending all logging operations in British Columbia forests have now been revoked by the B. C. Government as it is believed cooler weather has eliminated fire danger which increased to a very hazardous condition during early August in the Vancouver forest district.

Rubber Red Book

The 1939 edition of the Rubber Red Book, a directory of the rubber industry issued bi-annually, has just been published by The Rubber Age, 250 West 57th street, New York. The present edition includes many improvements and several new sections. The new material includes who's who in the rubber industry, sales agents and suppliers', branch offices, technical journals, and technical trade journals. The inclusion of an alphabetical index adds to the convenience of users of this standard directory, which sells for $4 a copy in paper binding and $5 bound in cloth.

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, September 20, 1939.

The paper industry and trade in common with other major industries and markets is experiencing a sharp upswing. A large increase in demand has occurred within the last two weeks and orders for most grades of paper and paper board are now running ahead of production. Considerable speculative buying is present, despite the good advice of leaders in the industry and trade cautioning against heavy speculative buying and the accumulation of unduly large inventories. Price advances in many grades of paper and paper board have already been made and the demand for paper is so large and prices are advancing so rapidly that the market is in a state of flux with uncertainity in the trade. This condition, of course, applies to other markets as well.

The index of general business activity rose to equal the level in the fall of 1937, for the week ended September 9, which advanced to 97.0 per cent, compared with 94.1 per cent for the preceding week and compared with 84.5 per cent for the corresponding period last year. Production of 193 paper mills was lower, due to the Labor Day holiday, and was estimated at 72.1 per cent for the week ended September 9, compared with 85.4 per cent for the previous week, and with 68.7 per cent for the corresponding week last year. Paper board production for the week ended September 9 was 63.0 per cent, compared with 57.0 per cent for the like period last year.

Paper production in the first half of 1939 was near the high record. A few mills reported higher earnings than last year, sixteen of which showed profits in the first half of 1939 of $3,255,688, compared with $2,834,892 for the like period last year, while two mills about equalled earnings of the first six months of last year, and four mills showed larger losses.

Little change has been reported in the newsprint market during the current week. Consumption has increased a little and as more advertising linage is reported in prospect, the future appears better than the present in respect to consumption. The International Paper Company has announced that all its customers will be taken care of at prevailing market prices and that its price on contract roll newsprint for the first quarter of 1940 will remain at $50 per ton, as at present.

No important change in resale prices of paper has been reported this week on white paper. Orders for kraft paper are reported at a high level and prices advanced last week on many grades. Superstandard is currently quoted at $4.25 per cwt., northern standard at $4, and standard (southern) wrapping at $3.62½ per cwt.

Tissue paper prices have also advanced on some grades under an active demand, but the advances have been very moderate and somewhat less than had been expected in some quarters of the trade.

The paper board market is reported as very active. Prices on many grades have sharply advanced. News is currently quoted at $42.50 per ton; chip at $40; single Manila light chip at $52.50; jute lined chip at $52.50, and white patent coated at $65 per ton.

Mechanical Pulp

Mechanical pulp is reported in some quarters of the trade as scarce. Prices have advanced. No. 1 imported, moist and dry, is currently quoted at from $28 to $32 per ton, on dock, Atlantic ports. No. 1 domestic and Canadian is quoted at from $38 to $40 per ton, delivered.

Chemical Pulp

Prices on all grades of imported and domestic chemical pulp, except bleached soda pulp, have advanced only moderately. More inquiries and orders are reported for this week. Domestic and foreign bleached sulphite is currently quoted at 2.50 to 2.60; easy bleaching at 2.20 to 2.40; strong unbleached at 2.15 to 2.40; kraft, bleached, 2.50 to 3.00; kraft, light and strong, 1.65 to 1.85; kraft No. 1, 1.65 to 1.80; all prices on dock, Atlantic, Gulf and West Coast ports. Domestic kraft is currently quoted at 1.60 to 2.00, f.o.b., pulp mill. The price of bleached soda pulp is unchanged at 2.55 delivered.

According to good authority, shipments of pulp from the north countries in Europe will be continued. As approximately 30 per cent of pulp has been carried in German ships, delays from former transportation schedules has caused much anxiety in the import trade. It is the general opinion, however, that shipping difficulties will be largely remedied within a reasonable period of time and no shortage of foreign pulp is expected to occur now or in the future.

Old Rope and Bagging

The old rope market is practically inactive and nominal prices prevail, with the basis price on domestic Manila at 3.00 and no business reported at this quotation.

Quotations on old bagging are practically nominal and trading is very light as packers are reported to be holding for better than prevailing prices, which they feel certain are ligely to be higher in the near future.

Rags

Representative market quotations on rags are of a nominal nature this week, with dealers showing a disposition to hold for more favorable prices. Mill buyers are reported in some quarters of the trade to be only interested in placing orders at prevailing prices.

Old Waste Paper

The news of the week in the old waste paper market is the advance of No. 1 waste paper to .50 and folded news to .55½, with no change in book stock, due to ample supplies on hand in Eastern mills.

Twine

Prices on all grades of hard and soft fiber twines are firm under a good demand. No change in prices has been reported since the advance of last week.

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, September 20, 1939.

BLANC FIXE—Prices on blanc fixe continue firm and are unchanged at prevailing market levels. The pulp is currently quoted at from $42.50 to $45 per ton, in bulk; the powder is offered at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER—Quotations on bleaching powder remain firm and conform to prevailing market quotations. Bleaching powder is quoted at from $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN—Prices on casein are firm under a good demand. Standard domestic casein, 20-30 mesh, is currently quoted at 17 cents per pound; 80-100 mesh, at 17½ cents per pound; all prices in bags, car lot quantities.

CAUSTIC SODA—Quotations on caustic soda continue firm and unchanged at prevailing market levels. Solid caustic soda is currently quoted at from $2.10 to $2.30 per 100 pounds; flake and ground at from $2.50 to $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Prices on china clay continue firm and remain unchanged at prevailing market levels. Domestic filler clay is quoted at from $6.50 to $12 per ton; coating clay at from $11 to $22 per ton, at mines. Imported clay is offered at from $13 to $25 per ton, ship side.

CHLORINE—Prices on chlorine continue firm and conform to prevailing market levels. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market is firm. Current quotations on some grades are higher. "G" gum rosin is quoted at $4.80 per 280 pounds, gross weight, in barrels, at Savannah. "FF" wood rosin is quoted at $4.65 per 280 pounds, gross weight, in barrels, New York. Seventy per cent gum rosin size is quoted at $2.99 per 100 pounds, f.o.b., shipping point.

SALT CAKE—Prices on salt cake continue firm and unchanged at prevailing market quotations. Prices range at from $12 to $13.50 per ton; chrome salt cake at from $11 to $12 per ton, f.o.b., shipping point. Prices on imported salt cake are nominal.

SODA ASH—Quotations on soda ash continue firm and unchanged at prevailing market levels. Prices on soda ash in car lots, at works, per 100 pounds, are as follows: in bulk, $.90; in bags, $1.05; and in barrels, $1.35.

STARCH—The corn starch market is reported as firm with prices a little higher this week. Globe pearl is currently quoted at $2.60 per 100 pounds; special paper starch at $2.70 per 100 pounds. All prices in bags, car lot quantities, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm and unchanged at prevailing market levels. The commercial grades are quoted at $1.15; iron free at $1.30 per 100 pounds, in bags, car lot quantities, f.o.b., works.

SULPHUR—Prices on sulphur continue firm and unchanged at prevailing market quotations. Annual contracts are quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are offered at $19 per ton.

TALC—Quotations on talc are firm. Domestic talc is currently offered at from $15 to $18 per ton, Eastern mines. Imported talc is quoted at from $23 to $45 per ton, on dock.

Market Quotations

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	@	—
Kraft—per cwt.—Delivered Zone A			
No. 1 Northern	$4.75	@	$5.25
Superstandard	4.25	@	4.75
Northern Standard Wrapping	4.00	@	—
Standard Wrapping	3.62½	@	—
Tissues—Per Ream—Carlots			
White No. 1	.87½	@	—
White No. 1 M. G.	.85	@	—
White No. 1½	.62½	@	—
White No. 2	.60	@	—
Anti-Tarnish M. G.	.65	@	—
Colored	.77½	@	—
Kraft	.65	@	—
Manila	.60	@	—
Unbl. Toilet, 1 M.	3.25	@	—
Bleached Toilet	5.26	@	—
Paper Towels, Per Case—			
Unbleached, Jr.	1.80	@	—
Bleached, Jr.	3.10	@	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	7.75	@	9.75
No. 1 Manila Wrapping, 35 lb.	5.00	@	—
No. 2 Manila Wrapping, 35 lb.	4.75	@	—
Boards, per ton—			
News	42.50	@	—
Chip	40.00	@	—
Sgl. Mla. Ll. Chip	52.50	@	—
Jute Lined Chip	52.50	@	—
White Pat. Coated	65.00	@	—
Kraft Liners	45.00	@	—
Binders Boards	71.00	@	77.00

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
100% Rag Ext. No. 1	$39.10	@ $46.00	$40.25	@ $47.25
100% Rag	31.05	@ 36.50	32.20	@ 37.75
85% Rag	.....		29.90	@ 35.00
75% Rag	23.60	@ 27.75	24.75	@ 29.00
65% Rag	.....		21.65	@ 26.25
50% Rag	17.55	@ 21.50	18.70	@ 22.75
25% Rag	14.65	@ 17.75	15.80	@ 19.25

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
No. 1	$8.60	@ $10.50	$9.75	@ $12.00
No. 2	7.70	@ 9.50	8.90	@ 10.75
No. 3	6.75	@ 8.25	7.90	@ 10.00
No. 4	7.00	@ 8.50	8.20	@ 10.00

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper, Delivered in Zone 1:

No. 1 Glossy Coated	$11.30	@	$12.75
No. 2 Glossy Coated	9.70	@	11.00
No. 3 Glossy Coated	8.60	@	10.00
No. 4 Glossy Coated	8.05	@	9.25
No. 1 Antique (watermarked)	8.05	@	9.25
No. 2 Offset	7.45	@	8.50
A Grade E. F.	7.20	@	8.25
A Grade S. & S. C.	7.45	@	8.50
B Grade E. F.	6.65	@	7.75
B Grade S. & S. C.	6.90	@	8.00
C Grade E. F.	6.40	@	7.50
C Grade S. & S. C.	6.65	@	7.75
D Grade E. F.	6.10	@	7.00
D Grade S. & S. C.	6.35	@	7.25

Ivory & India at $.50 cwt. extr

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	28.00	@	32.00
Dry	28.00	@	32.00
(Delivered)			
No. 1 Domestic and Canadian	38.00	@	40.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	2.50	@	2.60
Prime Qualities—			
Easy-Bleaching Sulphite	2.20	@	2.40
Strong Unbleached Sulphite	2.15	@	2.40
(On Dock, Atlantic Ports)			
Kraft Bleached	2.50	@	3.00
Kraft Light & Strong	1.65	@	1.85
Kraft No. 1	1.65	@	1.80
(F. o. b. Pulp Mill)			
Kraft Domestic	1.60	@	2.00
(Delivered)			
Soda Bleached	2.55	@	—

Add 60 cents per short ton, does charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	6.90	@	7.00
Silesias No. 1	4.50	@	4.75
New Unbleached	6.75	@	7.00
Blue Overall	4.90	@	5.00
Fancy	1.75	@	2.00
Washables	1.50	@	1.60
Mixed Khaki Cuttings	2.25	@	2.30
O. D. Khaki Cuttings	3.25	@	3.40

Old Rags

White, No. 1—			
Repacked	2.90	@	3.15
Miscellaneous	2.10	@	2.25
White, No. 2—			
Repacked	1.50	@	1.60
Miscellaneous	1.25	@	1.40
Thirds and Blues—			
Repacked	1.30	@	1.40
Miscellaneous	1.15	@	1.30
Roofing Rags—			
No. 1	.90	@	1.00
No. 2	.67½	@	.77½
No. 3 (bagging)	.55	@	.65
No. 4	.60	@	.65
No. 5A	.60	@	.65

Foreign Rags

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	@	2.20
New Light Silesias	5.50	@	5.75
Light Flannelettes	5.50	@	5.75
New White Cuttings	7.00	@	7.50
New Light Oxford	4.00	@	4.50
New Light Prints	3.00	@	3.25

Old Rags

No. 1 White Linens	7.50	@	8.50
No. 2 White Linens	6.50	@	7.50
No. 3 White Linens	4.50	@	—

HIGHEST QUALITY CLAYS

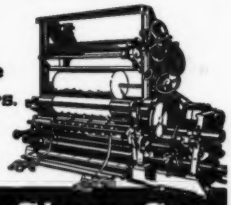
LUMP and POWDERED } IMPORTED — DOMESTIC { CRUDE CRUSHED, AIR FLOATED, WATER WASHED

PAPER MAKERS IMPORTING CO. INC. — EASTON, PENNSYLVANIA, U.S.A.

PRECIPITATED CALCIUM CARBONATE

LANGSTON SLITTERS AND ROLL WINDERS

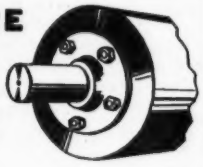
There is a type and size for every job—from tissue to heavy board—narrow to wide cuts—small to large diameters.
SAMUEL M. LANGSTON COMPANY, *Camden, N. J.*



—a Shear Cut—a Clean Cut.

PAPER MAKERS ARE PARTICULAR!

And their judgment selects Rodney Hunt's wood press rolls, as well as "Shaf-tite" felt rolls of wood, rubber or metal.



ALSO
Water Wheels and Turbines—Canal Gates—Gate Hoists—Racks and Rakes.
Endless Felt Washers

RODNEY HUNT
Machine Company
63 Maple St. Orange Mass.

WATERBURY FELTS

Are Made By

H. WATERBURY & SONS CO.
ORISKANY, NEW YORK

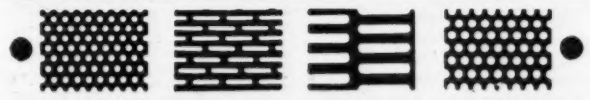
More than just a TRADE MARK

EXCELSIOR — Knox Woolen Co. Camden, Me. — FELTS & JACKETS

BUT also a guarantee by men who for 75 years have prided themselves in making finer felts. TO YOU—this is the mark of dependability, longer felt life and greater saving.

KNOX WOOLEN CO.
CAMDEN, MAINE.

SCREENS of Perforated Metal



The Harrington & King PERFORATING CO.
5652 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N.Y.

No. 4 White Linens	2.25	@	3.25
No. 1 White Cotton	4.25	@	4.75
No. 2 White Cotton	3.25	@	3.75
No. 3 White Cotton	2.50	@	3.00
No. 4 White Cotton	1.90	@	2.20
Extra Light Prints	2.00	@	2.40
Ord. Light Prints	1.75	@	2.15
Med. Light Prints	1.55	@	1.95
Dutch Blue Cottons	2.25	@	2.50
French Blue Linens	3.00	@	—
Checks and Blues	2.00	@	—
Linsey Garments	1.90	@	2.00
Dark Cottons	1.50	@	1.60
Old Shopperies	1.30	@	1.45
New Shopperies	1.45	@	1.50
French Blues	2.25	@	2.50

Old Rope and Bagging

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	1.60	@	1.75
Domestic	1.50	@	1.60
Wool Tares, light	1.60	@	1.70
Wool Tares, heavy	1.80	@	1.90
Bright Bagging	1.50	@	1.60
Manila Rope—			
Foreign	2.60	@	2.75
Domestic	2.75	@	3.00
Jute Threads	3.00	@	3.25
Sisal Strings	1.50	@	1.60
Mixed Strings	.55	@	.60

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	2.30	@	2.40
Ordinary Hard White No. 1	1.90	@	2.00
Soft White No. 1	1.60	@	1.75
Soft White Extra	2.25	@	2.40
Flat Stock—			
Stitchless	.80	@	.85
Overissue Mag	.70	@	.75
Solid Flat Book	.60	@	.65
Crumbled No. 1	.40	@	.45
Ledger Stock White	1.05	@	1.15
Ledger Stock Colored	.60	@	.70
Manila—			
New Env. Cut	1.40	@	1.50
New Cuttings	1.00	@	1.20
Old Kraft Machine—			
Compressed bales	.75	@	.80
News—			
No. 1 White News	1.25	@	1.30
Strictly Overissue	.40	@	.45
Strictly Folded	.55½	@	—
Corrugated	.45	@	.47½
No. 1 Mixed Paper	.50	@	—

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.14½	@	—
White Hemp	.15½	@	—
Fine Polished—			
Fine India	.17¾	@	—
Unpolished—			
Box	.09¾	@	—
Paper Makers	.10¾	@	.11¾
Tube Rope	.11½	@	.13¾
Wall Paper	.12¾	@	—
Wrapping	.13¾	@	—
Soft Fiber Rope	.12¾	@	.14¾
Cotton	.17¾	@	.20¾

(Hard Fiber)

Medium Java	.11	lb	.17
Mex. Sisal	.10	@	.16
Manila	.16	@	.23

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phil.)

Shirt Cuttings—			
New White, No. 1	.06	@	.06½
New White, No. 2	.03½	@	.04
Light Silesias	.03½	@	.04
Silesias, No. 1	—	@	.04½
Black Silesias, soft	.03	@	.03¾
New Unbleached	.05½	@	.06
Washable, No. 1	.01½	@	.01¾
Blue Overall	.04	@	.04½
Cottons—According to grades—			
Washable No. 2	.01	@	.01¼
New Blue	.01	@	.01¼
Fancy Percales	—	@	.02½
New Black Soft	.03	@	.03½
New Light Seconds	—	@	.04½
New Dark Seconds	.50	@	.75
Khaki Cuttings—			
No. 1 O. D.	.03	@	.03½
No. 2 Mixed	.02½	@	.02¾
Corduroy	—	@	.02
New Canvas	.05	@	.05½
New Black Mixed	.02½	@	.02¾

Domestic Rags (Old)

White No. 1—			
Repacked	2.75	@	3.00
Miscellaneous	2.00	@	2.25
Thirds and Blues—			
Miscellaneous	1.00	@	1.25
Repacked	1.50	@	1.75
Black Stockings (Export)	3.00	@	3.50
Roofing Stock—			
Foreign No. 1	.90	@	1.10
Domestic No. 1	.80	@	.90
Domestic No. 2	.60	@	.65
Roofing Bagging	.40	@	.45

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	—	@	1.50
Domestic	1.50	@	1.60
Manila Rope	—	@	3.25
Sisal Rope	1.50	@	1.75
Mixed Rope	.75	@	1.00
Scrap—			
No. 1	—	@	1.50
No. 2	.80	@	.90
Wool Tares, heavy	3.25	@	3.50
Mixed Strings	.45	@	.50
No. 1 New Light Burlap	2.50	@	3.00
New Burlap Cuttings	1.75	@	2.00

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White	2.25	@	2.30
No. 2 Hard White	1.90	@	2.00
No. 1 Soft White	1.75	@	1.80
No. 2 Soft White	1.40	@	1.50
No. 1 Mixed	.65	@	.75
Solid Ledger Stock	1.45	@	1.50
Ledger Stock, white	1.10	@	1.15
Ledger Stock, colored	.75	@	.80
No. 1 Books, heavy	.60	@	.65
Manila Cuttings	1.45	@	1.50
Print Manila	.45	@	.50
Container Manila	.42½	@	.47½
Kraft Paper	.70	@	.80
No. 1 Mixed Paper	.37½	@	.40
Straw Board Chip	.30	@	.35
Binders Board Chip	.35	@	.40
Corrugated Board	.50	@	.55
Overissue News	.45	@	.50
Old Newspapers	.40	@	.45

BOSTON

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White	2.25	@	2.50
No. 1 Soft White	1.85	@	2.15
No. 2 Mixed	.75	@	.80
Solid Ledger Books	1.30	@	—
Overissue Ledger Stock	1.30	@	1.50
Mixed Ledgers	.85	@	.90
No. 1 Books, heavy	.70	@	—
No. 1 Books, light	.65	@	.75
Crumpled Stitchless Book Stock	.55	@	.65
Manila Env. Cuttings	1.70	@	1.85
Manila Envelope Cuttings, Extra Quality	2.00	@	2.10
No. 1 Old Manila	.65	@	.70
White Blank News	1.30	@	1.40
No. 1 Kraft	.70	@	.80
Mixed Papers	.25	@	.27½
Print Manila	.45	@	.55
Container Manila	.32½	@	.35
Old Newspapers	.32½	@	.35
Paper Wool Strings	.60	@	.65
Overissue News	.45	@	.50
Box Board Chips	.25	@	.30
Corrugated Boxes	.35	@	.40
Kraft corrugated boxes	.65	@	.75
Screening Wrappers	.40	@	.45

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	2.50	@	2.65
Domestic	2.65	@	2.75
Sisal Rope	2.00	@	—
Mixed Rope	.45	@	.50
Transmission Rope	2.00	@	2.25
Soft Jute Rope	2.25	@	2.50
Jute Carpet Threads	.90	@	1.00
Gunny Bagging—			
Foreign	1.50	@	1.65
Domestic	1.35	@	1.40
Bleachery Burlap	2.50	@	2.70
Scrap Burlap—			
Foreign	1.35	@	1.40
Domestic	1.25	@	1.40
Scrap Sisal	1.55	@	1.60
Scrap Sisal for Shredding	1.75	@	1.80
Wool Tares, Heavy	1.40	@	1.50
New Burlap Cuttings	2.00	@	2.25
Aust. Wool Pouches	2.00	@	2.10
Heavy Baling Bagging	1.50	@	1.60
Paper Mill Bagging	.85	@	1.00
No. 2 Bagging	.45	@	.50

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.03¼	@	.03½
New White No. 1	.0675	@	.0690
New Light Flannelettes	.05	@	—
Silesias No. 1	.04	@	.04¼
New Black Silesias	.03½	@	.03¾
Soft Unbleached	6.50	@	7.00
Blue Cheviots	.05	@	.05¼
Fancy	.02	@	.02¼
Washable	.02	@	.02½
Cottons—According to grades—			
Blue Overalls	.04¾	@	.05
New Black, soft	.03¼	@	.04
Khaki Cuttings	.02½	@	.03
O. D. Khaki	.03	@	.03¼
Corduroy	.02¾	@	.03
New Canvas	.06¼	@	.07¼
B. V. D. Cuttings	.06¼	@	.07

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04¼	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues	1.75	@	2.00
Old Blue Overalls	1.50	@	—
Thirds and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62½
Black Stockings	3.90	@	4.00
Roofing Stock—			
No. 1	1.00	@	1.10
No. 2	.65	@	.70
No. 3	.45	@	.50

Foreign Rags

(F. o. b. Boston)

Dark Cottons	.90	@	1.00
Dutch Blues	2.65	@	2.75
New Checks and Blues	2.85	@	3.00
Old Fustians	2.25	@	2.50
Old Linsey Garments	2.10	@	2.25
New Silesias	3.75	@	4.00

CHICAGO

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings	1.80	@	1.90
No. 1 Hard White	1.70	@	1.80
No. 1 Soft White	1.50	@	—
Ledger & Writings	.75	@	.80
Solid Books	.45	@	.50
Blanks	.90	@	—
Krafts	.45	@	.50
New Kraft Cuts	1.10	@	—
Manila Env. Cuts	Nominal		
Ex. No. 1 Manila	Nominal		
Print Manila	Nominal		
Overissue News	.35	@	—
Old Newspapers—			
No. 1 Folded News	.25	@	.30
No. 1 Mixed Paper	.15	@	.20
Roofing Stocks—			
No. 1	1.00	@	1.05
No. 2	.85	@	—

TORONTO

Paper

Bonds

Direct mill shipment in two-ton lots

No. 1 White	$35.50	@	—
No. 1 Tints	26.50	@	—
No. 2 White	25.50	@	—
No. 2 Tints	26.50	@	—
No. 2 Golden Rod	27.50	@	—
No. 3 White	21.00	@	—
No. 4 White	15.00	@	—
No. 4 Tints	16.00	@	—
No. 4 Golden Rod	17.00	@	—
Direct mill shipment in three-ton lots			
No. 5 White	$10.50	@	—
No. 5 Tints	11.50	@	—
No. 5 Golden Rod	12.00	@	—
No. 6 White	9.00	@	—
No. 6 Tints	9.50	@	—
No. 6 Golden Rod	11.00	@	—
No. 7 White	8.00	@	—
No. 7 Tints	8.50	@	—
No. 7 Golden Rod	10.00	@	—
Book—			
No. 1 M. F.	$7.00	@	—
No. 2 M. F.	6.50	@	—
No. 3 M. F.	5.35	@	—
No. 1 S. C.	7.25	@	—
No. 2 S. C.	6.75	@	—
No. 3 S. C.	5.85	@	—

Coated Book & Litho

Ton Lots (resale)

No. 1	$12.00	@	—
No. 2	10.25	@	—
No. 3	8.90	@	—
Coated tinted	13.00	@	—
Wrapping—delivered—			
Rag Brown	4.85	@	5.25
White Wrap	4.00	@	—
"B" Manila	4.90	@	6.15
No. 1 Manila	5.50	@	6.90
Fiber	5.50	@	6.90
Kraft No. 2	5.50	@	6.90

(F. o. b. Cars, Toronto)

News per ton—			
Rolls (contract)	46.00	@	—
Sheets	54.00	@	—

Pulp

Ground wood	$29.00	@	—
Unbleached sulphite	44.00	@	—
Bleached sulphite	54.00	@	—
Kraft	50.00	@	—
Soda	54.00	@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut	2.00	@	—
Soft White	1.75	@	—
White Blk. News	1.25	@	1.10
Book and Ledger—			
Flat Magazine and Book Stock (old)	.70	@	—
Light and Crumpled Book Stock	.60	@	—
Ledgers and Writings	1.00	@	—
Manilas—			
New Manila Cut	1.35	@	—
Printed Manilas	.45	@	—
Kraft	.95	@	—
News and Scrap—			
Strictly Overissue	.50	@	—
Strictly Folded	.45	@	—
No. 1 Mixed Paper	.30	@	—

Domestic Rags

(Price to Mills, f.o.b. Toronto)

No. 1 White Shirt Cuttings	.06½	@	.06¾
Light Prints	.03	@	.03¼